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PREPARATION OF PLANS AND SPECIFICATIONS FOR POLLUTION ABATEMENT ACTIVITIES IN CHERRY CREEK WATERSHED, MARYLAND

Skelly and Loy

Prepared for:

Appalachian Regional Commission
Zollman Associates, Incorporated

July 1973

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Skelly and Loy/Zollman Associates, Inc.
Harrisburg, Pa. and Baltimore, Md.

APPALACHIAN REGIONAL COMMISSION

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The purpose of this project was to prepare plans and specifications which, when executed by a contractor, will abate the acid mine drainage presently polluting Cherry Creek in western Maryland. The abatement of this pollution will allow Cherry Creek to support a fisheries program, and will improve the quality of the water in Deep Creek Lake.

The study was performed in conjunction with the Environmental Protection Agency as part of an effort to deal with elimination and control of mine drainage. Benefits other than water quality improvement include the aesthetic benefits from strip mine reclamation since Cherry Creek is adjacent to the large Deep Creek Lake recreation area. The abatement measures will eliminate 95% of the net acid load in the Creek. The total construction project includes two strip mine reclamation sites in the Casselman River watershed. The effectiveness of this project depends on the actions of the coal industry which must control pollution from continued active mining.

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FOR
POLLUTION ABATEMENT ACTIVITIES
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CHERRY CREEK WATERSHED
MARYLAND

Prepared for

THE APPALACHIAN REGIONAL COMMISSION

ARC CONTRACT #73-35/RPC767

Prepared by

SKELLY AND LOY
Harrisburg, Pennsylvania

and

ZOLLMAN ASSOCIATES, INC.
Baltimore, Maryland

JULY 1973

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PREFACE

This study is one of a series of reports being prepared for the Appalachian Regional Commission for the development of an overall environmental pollution abatement plan for the Monongahela River Basin with special attention to mine drainage. The Basin is an 18-county area encompassing parts of Appalachian West Virginia, Pennsylvania and Maryland.

These studies are being performed under an agreement between the Environmental Protection Agency and the Commission and are part of a larger EPA effort to deal with elimination and control of mine drainage within the watershed. The Commission's major responsibility in this interagency effort is to evaluate the economic development impacts of mine drainage and other pollution abatement which will include for planning purposes those engineering studies necessary to determine cost effectiveness among possible alternative approaches and to assess the full range of activities required to improve the environment within the Basin consistent with water and land use objectives. It is felt that if pollutants and other environmentally degrading problems can be alleviated, other public and private investments will provide greater opportunities to improve the economy of the Basin. The results of these studies then should suggest courses of action for selecting priorities for environmental and associated projects to Federal, State, and local decision-makers and the private sector as well as clarifying the Basin's potential for economic development.

The preparation of plans and specifications for pollution abatement activities in Cherry Creek Watershed as described in this report was accomplished by means of a contract between the Appalachian Regional Commission (ARC) and a joint venture composed of two consulting engineering firms: Skelly and Loy, Harrisburg, Pennsylvania; and Zollman Associates, Inc., Baltimore, Maryland.

The purpose of this project was to prepare plans and specifications which, when executed by a contractor, will abate the acid mine drainage presently polluting Cherry Creek in western Maryland. The abatement of this pollution will allow Cherry Creek to support a fisheries program, and will improve the quality of the water in Deep Creek Lake.

The specific tasks performed under this contract are itemized point by point below and referenced by page numbers to this report. See also detailed descriptions starting on page 21.

ARC CONTRACT ARTICLE 2-5
SPECIFIC TASKS

(1). Property Ownership

See plan sheets in Appendix A and page 21.

(2). Surveys and Topographic Information

See plan sheets in Appendix A and page 21.

(3). Design Development

See Design Development section pages 22 - 30.

(4). Construction Documents

See Plans in Appendix A, Specifications in Appendix B, and Bid Forms in Appendix C.

(5). Cost Estimates

See Construction Cost Estimates in Appendix D.

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Appendix D – Construction Cost Estimates

THE FEASIBILITY STUDY

The Cherry Creek Watershed was studied as part of a mine drainage abatement feasibility study for the Casselman River, Upper Youghiogheny River and Cherry Creek Watersheds in western Maryland. This study was performed for the State of Maryland between November 1971 and May 1973. The Appalachian Regional Commission funded the preparation of plans and specifications for the Cherry Creek Mine Drainage Abatement Plan as set forth in the report entitled "Mine Drainage Pollution Watershed Survey, Cherry Creek and Casselman River Watersheds" which is available from the Maryland Department of Natural Resources.

A feasibility study was conducted in the Casselman River and Cherry Creek Watersheds as a result of water quality surveys conducted by the State of Maryland. These surveys revealed that these streams were being polluted by mine drainage. The purpose of the feasibility study was to perform the necessary steps leading to a mine drainage abatement plan for the watersheds. The following portion of this report is a summary of the previously mentioned report.

Most of the available data was collected early in the study. Published data provided much information concerning the geology, mines, and water quality. Early collection of data prevented duplication of previous

Pages 1 and 2 are Blank.

efforts.

Mine maps, geologic maps, coal reserve maps, surface maps, mine location maps, stream flow data, aerial photos, tax maps and other pertinent data were obtained from various state and federal agencies and local citizens.

A field reconnaissance was performed early in the study to locate the mine drainage points. Each mine was field checked, notes recorded, and field pH's taken at every discharge.

When the pollution source sampling station locations were established, the network of the receiving streams was analyzed to establish a stream sampling program designed to:

1) measure the effects of mine drainage throughout the receiving streams of the watershed.

2) measure the quality of natural or unpolluted streams in the watershed to provide background data. This is helpful in ascertaining the water quality potential of a stream, and to provide a basis for determing the actual amount of water quality degradation due to mine discharges.

3) function as a check on the reconnaissance field investigation phase. A well designed stream sampling network can be used to locate previously undiscovered sources of pollution.

Sampling stations for measuring flow consisted of wood V-notch weirs, stream cross sections, or bucket and stopwatch. These were established and visited fourteen times (where possible) during the course of the study year.

All of the samples were routinely analyzed for pH and the usual mine drainage constituents. A second sample was taken at designated "aquatic biota" sampling stations and analyzed for constituents affecting aquatic life.

The "aquatic biota" stations were selected to sample the headwaters and mouth of the major streams to determine the amount of pollution being discharged into each stream. Other stations were selected at locations where it was known that mine pollution did not exist. This was done so that the natural background chemistry of the water could be determined.

Aerial photo interpretation maps (geological) were field checked for accuracy against known coal outcrops. They were also used in a reconnaissance of the watershed to locate mines and to plot their discharges. A hydrologic evaluation of each mine was made to determine the cause of any acid mine drainage. Coal outcrops were walked in the vicinity of mines to locate additional mines and discharges.

Analysis of available data on deep mine pollution sources indicated the need for a deep mine abatement plan. Absence of mine maps and historical records for these deep mines further indicated a need for test borings to establish feasibility of the possible abatement techniques. Four test borings were drilled into the two Cherry Creek deep mines. These borings provided vital information on the hydrologic and geologic conditions within these mines necessary to develop feasible abatement plans.

The evaluation of pollution sources was accomplished in conjunction with work under other phases. Each pollution source was evaluated from a broader, total watershed standpoint. Each discharge was isolated and evaluated for its affect on the water quality of the receiving stream. The water quality in the streams were then evaluated to determine the specific amount of mine drainage degradation. This helped to establish the degree of water quality improvement desired. This further established the level of abatement required at each pollution source to achieve the desired water quality in the receiving stream.

All possible abatement techniques were considered and evaluated for each pollution source. Several abatement methods can sometimes be applied to each pollution source. However, the primary factor in evaluating each method was the desired result determined during the pollution source evaluation. The least expensive technique that would achieve this desired result was chosen in every case.

The high degree of pollution in Cherry Creek became evident early in the Feasibility Study. The entire Cherry Creek Watershed was designated as a "Quick Start Project" in order to accelerate an abatement program.

Cherry Creek is polluted mainly by acid. It carries an average of 2,276 lbs/day net acidity at sample station 600 and has a consistently low pH. Cherry Creek is a tributary to Deep Creek Lake, a major tourist attraction and source of income in economically depressed Garrett County, Maryland. Cherry Creek is the only significant source of acid mine drainage to Deep Creek Lake, which is a semi-sterile body of water. It has low nutritive values and a depressed pH. The exact effect of the Cherry Creek acid load upon the lake is not known, but generally it is that of further lowering of an already depressed pH. The complaints of local citizens regarding the mine drainage entering the lake via Cherry Creek helped focus attention on this problem. The abatement of mine drainage in Cherry Creek will result in an increase in the water quality of Deep Creek Lake.

Water sampling and field explorations showed that there are eight mines discharging polluted water to Cherry Creek. These mines are discharging an average total of 659 lbs/day net acid, yet Cherry Creek carries an average total of 2,276 lbs/day net acid. Further investigations revealed that most of the acid in Cherry Creek is due to natural (non-mining) sources such as naturally acidic ground waters and natural acids generated in the many swampy areas of the watershed. The large quantities of natural acids were verified by sampling portions of the headwaters where no mining has taken place. These non-mined areas exhibited low pHs (in the 4.2 to 5.5 range) along with low sulfate readings (averaging 12 mg/l). Acid mine water has characteristically high sulfate concentrations. Approximately 72% of the total acid load in Cherry Creek is due to natural (non-mine related) conditions.

Cherry Creek at one time supported a trout population even though it has high natural acidities. All aquatic life disappeared when mining began in the watershed. Cherry Creek should again be capable of supporting a trout population if the mine drainage is eliminated. However, due to the prevailing low pH of this water, fish stocking should be from "native" brook trout populations collected from local streams, rather than from hatchery raised fish which are not tolerant of low pH.

In order to re-establish a sports fishery it would be necessary to eliminate almost all of the acid mine drainage because of the high natural acidity levels and low buffering capacity. The abatement measures are therefore designed to eliminate practically all of the acid mine drainage entering Cherry Creek.

The mine drainage pollution sources are widely distributed, causing the entire main stem of Cherry Creek to be grossly polluted. Six of the pollution sources are strip mine drainages, and the remaining two are from deep mines. An abatement plan was formulated for each pollution source after a detailed field exploration of each mine.

Two of the strip mines (217 and 218) do not drain to Cherry Creek, but are near the watershed divide and drain to the Casselman River. Both of these mines are pollution sources that require abatement. The mines are adjacent to several strip mines in the Cherry Creek Watershed for which abatement is recommended. It was, therefore, recommended that the reclamation measures required to abate these discharges be included in this Cherry Creek reclamation project. Including these mines in the total contract will result in a lower mine drainage abatement cost than if this work were bid separately, as would otherwise be required. Both of these mines discharge to Glade Run, which is a tributary to the North Branch of the Casselman River.

Abatement is also recommended for the several small pollution sources for which control measures will be relatively expensive. Again, this is because Cherry Creek cannot tolerate any acid mine drainage.

DESIGN DEVELOPMENT

The design for the preparation of the abatement plans and specifications for the Cherry Creek Watershed began in December 1972. Photogrammetric mapping (1"=100', 5' contours) was obtained for all eight mine sites after ground control surveys were performed. Several extensive field explorations were conducted to set design parameters and to choose specific abatement plans. Several possible abatement schemes were considered for use at each mine site. The plans and specifications were developed on the basis of achieving maximum abatement toward the goal of restoring Cherry Creek to its pre-mining condition and improving water quality in Deep Creek Lake.

Regrading and surface restoration are the only practicable abatement techniques applicable to the six strip mine sites. Full contour regrading was chosen as the best technique for five of the sites because it is the most effective and aesthetically pleasing type of regrading. The geometry of these five mines is such that contour grading requires only a minimal increased expense over the less effective techniques such as terrace regrading. Contour regrading was not deemed feasible for strip mine 809 because of the large amount of earthwork and the small acid load. Swale regrading is recommended as an effective reclamation technique for this

Pages 10, 11 and 12 are Blank.

mine. The function of regrading is to encourage runoff, reduce infiltration of water from the surface, bury acid materials, reduce erosion and establish a suitable surface for vegetation. Sediment control measures were incorporated into the plans where required. Strip mine regrading has been proven effective many times throughout the coal fields.

The goal of the strip mine reclamation plans is to reduce the air and water contact with acid forming materials. Regrading is not sufficient, in itself, to achieve these goals. Surface water diversion and the establishment of vegetation on the regraded surface are required, in addition to regrading, to accomplish these goals.

Surface water diversion is accomplished by the construction of diversion ditches above the highwall to carry surface water around the mine. Decreasing the amount of water passing through the mine reduces the amount of leaching of acid forming materials.

The establishment of heavy vegetative cover of grasses, shrubs and trees is essential for the effective abatement of acid from strip mines. A vegetative cover eventually builds up a soil profile on the regraded surface of the mine. The soil profile allows the establishment of a soil ecosystem. The soil bacteria effectively utilize free air oxygen and act as a barrier that reduces the amount of oxygen entering the spoil. Oxygen is a required component in the acid forming reaction. A soil profile also increases the surface retention of water, thereby reducing the water influx to the underlying spoil. The vegetation functions as a surface stabilizer that will control erosion, and utilizes water in its life function, further reducing water infiltrating to the underlying spoil.

A vegetative cover is difficult to establish in the absence of soil and in the acidic spoils of Cherry Creek. Applications of lime or ground agricultural limestone are normally used to neutralize the spoil to conditions suitable for vegetative growth. These neutralizers are of short lived effectiveness and the spoil can return to its acidic condition several years after reclamation. A long term alkalinity source would be more appropriate in Cherry Creek for two reasons: 1) the spoils are highly acid and 2) maximum abatement is required. Heavy applications of relatively inexpensive limestone screenings from rock crushers were chosen as a long term source of alkalinity. These screenings are an aggregate of particle sizes ranging from dust to pieces an inch in diameter. The very fine particles will dissolve quickly, producing an alkaline surface condition required for the establishment of grasses. The larger particles will release alkalinity at a slower rate, providing a long term source of alkalinity required for the long term maintenance of a heavy vegetative cover. The amount of alkalinity will, of course, decrease with time. The effectiveness of the limestone screenings has not been demonstrated, but it is estimated that there will still be alkalinity present at least 25 years after reclamation. At this point, the vegetation will be well established. Acid production at the surface will be minimal because of the long term effects of the vegetation and subsequent soil profile, and therefore alkalinity will no longer be required.

These large amounts of inexpensive alkalinity provide an additional benefit in that any excess alkalinity discharged from the strip mines will help to neutralize the organic acids in Cherry Creek.

An application of fertilizer is also required because of the low nutritive value of the mine spoil. A mulch is also called for to aid in seed germination and to provide erosion control for the period prior to the establishment of vegetation.

The species of vegetation to be planted were selected to: 1) increase the effectiveness of the abatement by establishing a dense ground cover and 2) provide future sources of food for the area's wildlife.

A combination grass, legume, shrub and tree seeding mixture is recommended for the Cherry Creek area. The recommended grass is Weeping lovegrass - *Erayrostis curvula*, the legume is Birdsfoot trefoil - *Lotus Corniculatus*, and the shrubs and trees to be direct seeded are Autumn Olive - *Elaeagnus umbellata*, Cardinal variety, and Black locust - *Robinia pseudoacocia*.

This combination is recommended to achieve several purposes. First to establish a quick vegetative growth to prevent erosion of the regraded soil and to stabilize the surface. Second, specific plants have been selected for their ability to grow in an acid soil which is devoid of humus and exhibits a stony profile. The plants were selected, when possible, according to their usefulness to wildlife. Weeping lovegrass is utilized by several species of songbirds and small mammals. Birdsfoot trefoil of the family Lotus, known also as Deervetches, is an important food source for birds and both small and large mammals. Birdsfoot trefoil is a legume so it also benefits other plant life by its ability to fix nitrogen. It will not grow as tall as other legumes such as the lespedezas, and so competes less with brush and tree growth.

The shrub autumn olive is well known for its acceptance by many species of wildlife as well as being a very attractive shrub. The one advantage of autumn olive over other berry producing plants is that its berries stay on the shrub throughout the winter and provide a good source of food for wildlife during the period of food scarcity.

Black locust was recommended for its ability to grow in very adverse soil conditions, as well as its nitrogen fixing ability. This makes it a good nursery tree for other plant life. Its acceptance by wildlife is only fair, and the tree is subject to the locust borer which kills it within seven to ten years. Its soil stabilizing and nitrogen fixing qualities, however, do contribute an overall benefit for poor land sites such as strip mines.

The surface must be prepared for seeding and limestone application. Roto-tilling is preferred, where possible, to thoroughly mix the limestone into the soil. The surface should then be disced to prepare a seed bed. Fertilization will be necessary to establish the grass and legume cover. Fertilizer is to be applied at a rate of 60 pounds of nitrogen per acre, 44 pounds of phosphorous per acre and 20 pounds of potash per acre.

For the recommended grass, legume, shrub and tree combination, the following seeding quantities apply to direct seeding methods:

Weeping lovegrass	10 lbs/acre
Birdsfoot trefoil	8 lbs/acre
Autumn olive	3 lbs/acre
Black locust	2 lbs/acre

The legume seed (Birdsfoot trefoil, Autumn olive and Black locust) is to be inoculated and the trefoil is to be scarified. All seed should be from a certified source.

Direct seeding of the shrub and tree species was recommended in the interest of economy. A higher success of plant growth could be achieved by planting seedlings, but this would add considerable cost to the project. It is anticipated that the percentage of shrub and tree growth obtained from direct seeding will achieve the purpose of this vegetative recommendation. This seeding combination has been recommended to achieve the above-mentioned results of establishing a quick cover growth, a long range stabilized vegetative cover, and to be useful to wildlife. Recommended species have been chosen for their individual growth characteristics to achieve these results. Weeping lovegrass is an annual that will die out in two to three years. It is not highly competitive with other plant growth and will allow companion establishment of other plant species seeded at the same time. After the lovegrass has died out, the trefoil, autumn olive and locust should be dominating the site with additional growth of native species that self-seed. On the long term, the site should contain a good base of native grasses, legumes and native trees in addition to the longer lasting autumn olive.

There are two general techniques available for the abatement of the two deep mine discharges: deep mine sealing or daylighting. Deep mine sealing causes inundation of the deep mine workings, thereby eliminating the free air oxygen required for the oxidation of the acid forming pyrite. Daylighting involves stripping out the deep mine workings and results in a strip mine. The removal of the overburden during daylighting is expensive and should only be used where there is recoverable coal that can be marketed for sufficient funds to significantly offset the cost of the project. Daylighting has not yet proven effective and is of questionable value because of the scar it leaves on the land surface. This technique should be reserved for cases where other deep mine abatement techniques will not be successful. Furthermore, local citizens believe that there is little recoverable coal in these deep mines.

Mine sealing is recommended as the best technique for these two deep mines. Mine 904 is very small and has a small discharge. It is estimated that only 5 feet rise in the water level will be required to completely flood the mine. A clay seal was chosen at this location because it is inexpensive and capable of producing the required inundation.

Deep mine 902 is larger and will require stronger sealing techniques for complete inundation. Complete flooding of this mine will require the installation of a seal capable of withstanding 35 feet of head. A gunite concrete deep mine seal was chosen because it has the strength to withstand the expected pressure. The gunite seal is formed by spraying gunite in the mine opening until a solid concrete plug is formed. This spraying process will introduce concrete sealants into the crevices in the sides and roof of the seal area. The sealing of these cracks will reduce leakage around the seal. This sealing operation should be particularly effective at this location because the entryways are slopes, and there is no coal outcrop at the point of maximum head to allow seepage of the mine water. Curtain grouting is called for in the seal area to prevent mine water leakage through this disturbed area.

Deep mine sealing and curtain grouting have been successfully demonstrated at several locations including Moraine State Park, Pennsylvania.

The specifications were developed using the Construction Specifications Institute format. The specifications will give the contractor an easy-to-follow, concise explanation of the plans, including scope of work, materials, construction requirements, and method of payment.

Following is a point-by-point description of how this report is responsive to the requirements in Article 2-5 (Specific Tasks) of the ARC Contract. The outline of this report follows the outline under Article 2-5 of this Contract.

(1) Property ownership. Property lines were plotted on the plan sheets from current tax maps obtained from the State of Maryland. Property owners' names and addresses were listed from information obtained from the tax assessment office.

(2) Surveys and Topographic Information. Aerial photographs, which were the basis for the contour plans, were obtained from the State of Maryland. Ground control required for the photogrammetrics was established, computed, and field surveyed prior to plotting of final mapping. Photogrammetrics (to the scale of 1"=100' with a 5' contour

interval) showing existing topographic and cultural features are provided as the base mapping for plan development. Mapping for each pollution source was field checked and found to be satisfactory prior to initiation of design.

(3) Design Development. Preliminary design documents were prepared to develop a basis for final plans. Preliminary design considerations included:

A. Pollution Source 902 - Concrete Deep Mine Seal

1. The mine openings were field located and shown on the plans. It was determined by cost comparisons, structural stability, hydraulic computations and geological analysis that the three concrete deep mine seals should be placed by excavating the mine opening and constructed as shown on the plans and described in the specifications.
2. Location of the grout curtain was determined from the location and geometry of the mine seals. The extent of the grout curtain was determined by geological analysis and engineering judgement.
3. Location of access roads was determined from field views of the project sites. In each case the most accessible route was shown.

4. It was decided from detailed field explorations that surface sealing will not be required in any location.

5. The location and alignment of the grout drill holes was determined from the location of the deep mine seals and local geology. The diameter and minimum number of drill holes required was determined by engineering judgement, geological analysis and past experience. Estimated depths were determined from existing test boring data and geological analysis.

6. Location of the mine pump-down hole/monitoring well was determined from the existing test boring information, and from evaluation of existing ground and mine pool elevations. The monitoring well will also be used as a mine pool regulation device. Should the mine pool ever exceed the maximum design level, a discharge will occur through this bore hole, thus preventing the mine pool from ever exceeding the maximum design level. A manually operated pressure release system is also incorpo-

rated in the mine seal to provide for mine pool drawdown in the event of a failure or other dangerous condition.

7. Elimination of flowing water in the mine entry prior to construction of the seals will be accomplished by pumping the water through the pumpdown hole/monitoring well. The need for this was determined from existing test boring information showing present mine water levels in the seal area.
8. The site will be cleared, soil stockpiled, and the overburden excavated prior to placement of the seals. After backfill is placed over the mine seals and soil has been replaced, the site shall be limed, fertilized, seeded, and mulched. Necessary sediment control measures shall be incorporated.
9. Location of access roads was determined from field views of the project sites. In each case the most accessible route was shown.

This pollution source discharges an average of 34 lbs/day acid.

Estimated Construction Cost = $51,600.

B. Pollution Source 904 - Clay Plug.

1. Location and dimensions of the clay plug were determined from field data, test boring data, and geological analysis. The location of the underground drain exiting from the mine opening to a point discharge near Cherry Creek, and the elevations of the existing coal seam and entryway, determined the depth of the clay plug. Because of data compiled from field views and additional analysis, it was determined that only one of the existing four mine openings required sealing. It was originally thought that all four mines were connected, but a test boring and further field explorations indicate that the mines are not connected, eliminating the necessity of three of the seals. The other three openings should be monitored periodically for seeps or breakouts. The clay plug will be constructed by methods described in the plans and specifications.

2 & 3. The items mentioned in these sections were determined from field views, existing test borings, geological mapping, and engineering judgement.

4. Location of access roads was determined from field

views at the project site. In each case the most accessible route was shown.

5. It was determined from detailed field explorations that surface sealing will not be required in any location.

6. As determined from field views, test borings and photogrammetric mapping, the site will be cleared and the overburden excavated prior to placement of the seal. Soil will be stockpiled and spread over the backfilled surface, after which the site shall be limed, fertilized, seeded and mulched. No sediment control measures will be necessary.

This pollution source discharges an average of 5 lbs/day acid.

Total Estimated Construction Cost = $4,000.

C. Pollution Sources 217, 218, 805, 808, 809 and 810 - Strip Mine Reclamation

1. Areas of bony material and burial sites were located during field views. Quantities of excavation for removal of the bony material were computed from cross sections, which were taken from the photo-

grammetric mapping. Construction details are described in the construction plans and specifications.

2. Diversion ditches were primarily located to divert all surface water around the regraded strip mine. Where the drainage areas were negligible, the diversion ditches were eliminated, because the additional cost was not justified. Alignment and grades were developed on the plans and checked in the field. Ditch outlets were also checked in the field to insure against property damage, and to ascertain the flow capacity of the receiving flow channel. The diversion ditches will also serve as sediment control devices by reducing erosion of the newly graded surface.
3. All water impoundments were located in the field and shown on the construction plans. Depth of water in the ponds was measured in the field and shown on the construction cross sections. Impoundments will be dewatered by ditches or pumping and the discharges neutralized. Sediment control provisions were made where required.
4. A clay lined basin and swale was provided at pollution

source 217 to collect and channel water emanating from springs at the highwall away from the mine. The springs were located from field views and aerial photography. The clay swale method was chosen after comparison of cost and effectiveness data with other methods.

5. Various grading schemes were analyzed and compared on the basis of pollution abated, cost effectiveness, quantity of earthmoving, soil stability, and drainage characteristics. The scheme that would abate the required amount of acid with the least amount of earthmoving was chosen for each strip mine project. Design for each project was then field checked. Earthwork was computed from cross sections, which were plotted from the photogrammetric mapping. Earthwork for each strip mine project was balanced within approximately 500' areas along the cross section base line shown on the plans. This was done to minimize the high cost of moving earth excessive distances. Each strip mine project is designed to be regraded to

contour, with the exception of Pollution Source 809. This project was designed on the basis of swale backfilling, which amounts to placing a swale in the existing strip cut parallel to the existing highwall. This method will reduce the amount of earthwork without reducing the effectiveness of the pollution abatement. Revegetation consists of limestone screenings, fertilizing, seeding, and mulching. The limestone screenings surface treatment was used to provide long term alkalinity for the enhancement of vegetation and to neutralize some of the organic acids in Cherry Creek. Application rates and other construction criteria are described in the plans and specifications.

6. Drawings were prepared showing existing and proposed contours. Plan sheets for each project are 1"=100' scale. Existing contours and topographic features, which were taken from aerial photographs, are ink on mylar. Proposed contours are shown in pencil on the drawings. Also included with the draw-

ings are cross sections and detail sheets.

7, 8, 9, 10. It was determined from field views and analysis of geologic data that sealing springs, repairing breeches in outcrop barriers, exploratory excavation, and clearing of stream channels is not necessary.

11. The regrading projects were analyzed to determine the need for sediment control measures. Sediment control devices are provided where shown on the construction drawings.

The six pollution sources discharge an average of 721 lbs/day acid. The total estimated construction cost for the six strip mine regrading projects is $239,500. A more detailed cost breakdown is given in the table in the "Expected Results" section and Appendix D of this report.

(4) Construction Documents

A. Following the preliminary review with the State of Maryland's Department of General Services, a complete and final set of construction drawings in pencil on mylar was prepared, based on the design specified in (3) above. The information on the drawings was expanded to fulfill the final construction drawing criteria. All additions and/or corrections requested by the preliminary review were made at this time.

B. Following the preliminary review, a complete and final set of construction specifications was prepared based on the design indicated previously. The specifications were expanded from the outline specifications submitted for the preliminary review. Bid Forms were also completed and added to the specifications. Specifications were developed using the Construction Specifications Institute format.

C. The Contractor shall perform all work, described in the plans and specifications, to abate the acid pollution emanating from the various pollution sources resulting from previous coal mining operations. Clearing and grubbing operations should be performed as the first item of construction. Any anti-pollution laws pertinent to clearing operations should be investigated and acted upon as required.

Diversion ditches and related operations should be constructed before grading operations, dewatering operations, and mine pump-down operations are started. All necessary sediment control devices should be constructed in conjunction with these items.

Dewatering operations should be completed before grading operations begin. Mine pump-down operations may be completed before, or may be done in conjunction with, excavation for the deep mine seals. All discharges from dewatering and pump-down operations must be neutralized and discharged at rates as specified.

Grading operations shall be performed in a manner to cause the finished graded surface to be in close conformity with the contour plans. Burial of bony material may be done in conjunction with the grading operations.

Excavation for the deep mine seals and clay plug should be completed before mine sealing operations are started. Care should be exercised to segregate and stockpile the topsoil from the areas to be disturbed. Mine pump-down operations should be continued through the excavation procedures.

Mine seal installations should be completed and the concrete completely cured before backfilling operations begin. The pipe emergency release should be installed during the mine seal installation. Other related operations may be done in conjunction with the mine sealing. The grout curtain installation should be started after backfilling operations are completed. Mine pump down operations should continue until the mine seals and grout curtain are completely cured.

Revegetation operations may be started after the grading operations are either totally or partially completed. The sequence of operations outlined in the specifications should be followed closely by the Contractor, because this is the most important construction operation for strip mine abatement projects.

(5) Cost Estimates

A. Detailed construction cost estimates were prepared based on quantity computations and unit prices.

B. Unit prices were based on information obtained from previous construction bids for acid mine drainage abatement in Pennsylvania, computed costs from construction cost manuals, and telephone conversations with various suppliers. The quantities were computed from field measurements and scaled dimensions from the plans and cross sections.

EXPECTED RESULTS

Abatement of the acid mine drainage will improve the water quality in Cherry Creek to the extent that a trout population can be re-established. The abatement measure will also improve water quality in Deep Creek Lake. Benefits other than water quality improvements will also accrue. The attendent aesthetic benefits from strip mine reclamation will be of value in Cherry Creek due to its geographic position adjacent to the large Deep Creek Lake recreation area. The autumn olive chosen for inclusion in the revegetation of the strip mines is an excellent game food plant. The enhancement of wildlife in this recreational setting will also be of benefit.

Cherry Creek carries an average net acid load of 2,276 lbs/day at sample station 600. The mine pollution accounts for 659 lbs/day or 29% of the total net acid load. The proposed abatement measures are designed to eliminate 95% of this mine acid or 627 lbs/day. This will reduce the total acid load in Cherry Creek from 2,276 lbs/day to 1,649 lbs/day for a reduction of 28%.

The total construction project includes the two strip mine reclamation sites in the Casselman River Watershed. These two mines presently discharge an average of 101 lbs/day of acid. It is estimated that 96 lbs/day acid will be abated at these sites.

Pages 35 and 36 are Blank.

There is an average total of 760 lbs/day acid from the eight pollution sources. The expected average acid reduction for the total project is 723 lbs/day.

The acid load reductions are further projected on an individual mine basis. The mine sealing is expected to completely eliminate the deep mine discharges. The strip mine reclamation plans are expected to result in a 95% reduction of their present acid discharges. The strip mine acid reduction may not reach 95% immediately after construction. The reduction of strip mine acid is expected to increase as the vegetation becomes more effective, ultimately resulting in a 95% (and possibly higher) reduction in acid load.

The effectiveness of this abatement plan in the restoration of Cherry Creek is also dependent upon the actions of the coal industry. Pollution from the continuing active mining must be controlled to realize the benefits of the pollution abatement from the abandoned mines. Maryland's active strip mining law will be effective in controlling pollution from future mining if properly enforced.

The following table details the present acid loads, the expected acid load reductions, and estimated construction cost for each pollution source.

SUMMARY TABLE
ACID LOAD AND COST

Pollution Source Number	Present Average Acid Load (lbs/day)	Expected Average Acid Load Reduction (lbs/day)	Average Post Abatement Acid Load (lbs/day)	Estimated Construction Cost
217	58	55	3	$ 53,200
218	43	41	2	18,800
805	315	299	16	68,700
808	152	144	8	33,000
809	34	32	2	41,500
810	119	113	6	24,200
902	34	34	0	51,600
904	5	5	0	4,000
Total	760	723	37	$295,000

NOTE: This table includes the two pollution sources in the Casselman River (Pollution Source Numbers 217 and 218).

The total estimated construction cost is $298,000 because of the addition of $3,000 for a field construction office.

The following measures are recommended for future action to insure the effectiveness of the reclamation project.

1. Periodic monitoring of the sealed deep mines for seepage and/or breakouts.

2. Periodic maintenance inspection of regraded strip mines to determine if additional applications of fertilizer and seed are required and to remedy any erosional damage that may occur.

3. Livestock grazing and overall land use should be limited until vegetative cover is well established.

4. The regraded surface should not be physically disturbed by plowing or construction.

5. Strip mining the outcrops of the sealed deep mines should be prohibited.

6. All mining laws should be strictly enforced in the Cherry Creek Watershed to prevent future pollution that could render the abatement projects useless.

APPENDICES

APPENDIX A

PLANS

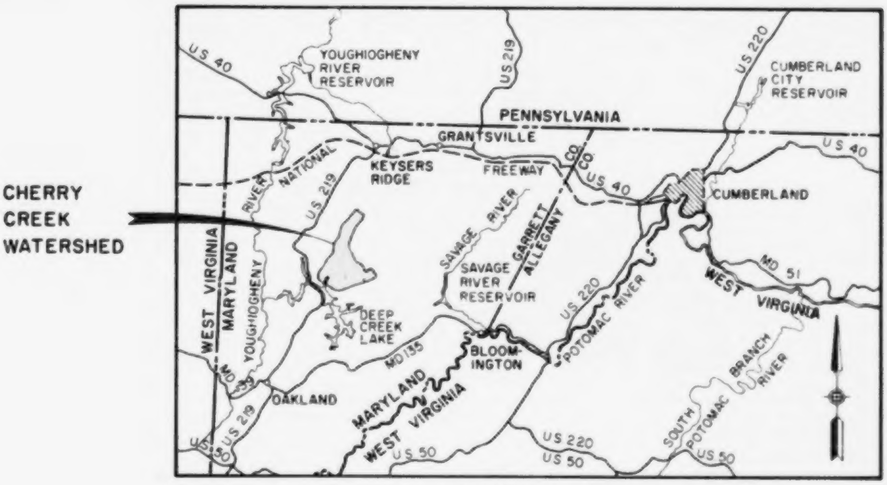
CHERRY CREEK WATERSHED
MINE RECLAMATION &
POLLUTION ABATEMENT

STATE OF MARYLAND

DEPARTMENT OF GENERAL SERVICES
GEORGE R. LEWIS - SECRETARY

DEPARTMENT OF NATURAL RESOURCES
JAMES B. COULTER - SECRETARY

BOARD OF PUBLIC WORKS
MARVIN MANDEL - GOVERNOR
LOUIS L. GOLDSTEIN - COMPTROLLER
J. MILLARD TAWES - TREASURER


CHERRY
CREEK
WATERSHED
US 40
YOUGHIOGHENY
RIVER
RESERVOIR
US 219
US 220
CUMBERLAND
CITY
RESERVOIR
PENNSYLVANIA
GRANTSVILLE
KEYSERS
RIDGE
NATIONAL
FREEWAY
US 40
CUMBERLAND
RIVER
US 219
GARRETT
ALLEGANY
CO
CO
SAVAGE RIVER
SAVAGE
RIVER
RESERVOIR
MD 51
WEST VIRGINIA
WEST VIRGINIA
MARYLAND
YOUGHIOGHENY
DEEP
CREEK
LAKE
US 220
POTOMAC RIVER
MD 135
BLOOMINGTON
MD 135
OAKLAND
US 219
US 50
MARYLAND
WEST VIRGINIA
US 50
US 220
US 50
SOUTH
BRANCH
POTOMAC
RIVER
US 50

LOCATION MAP

0 5 10

SCALE IN MILES

THESE PLANS AND SPECIFICATIONS FOR THE INDICATED PUBLIC IMPROVEMENT WERE PREPARED UNDER MY SUPERVISION AND TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF THEY COMPLY WITH THE REQUIREMENTS OF THE BUILDING CODE OF THE STATE OF MARYLAND

DATE: 6/10/73

MARYLAND REGISTRATION NO. 7667

6/8/74 Keith C Keller

LeRoy David Loy Jr

Prepared By

ZOLLMAN ASSOCIATES, INC.

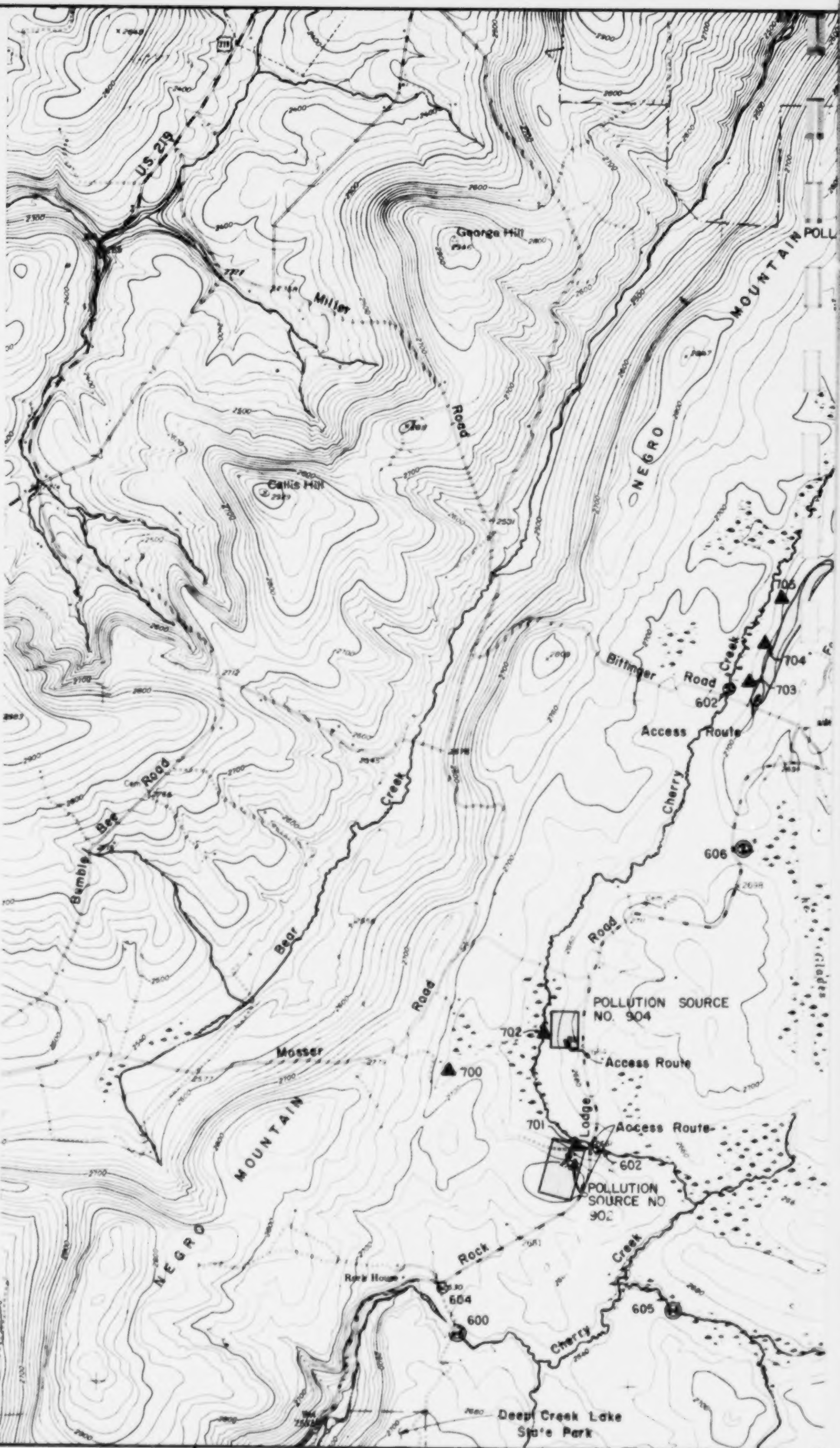
CONSULTING ENGINEERS

BALTIMORE, MARYLAND

SKELLY AND LOY

ENGINEERS CONSULTANTS

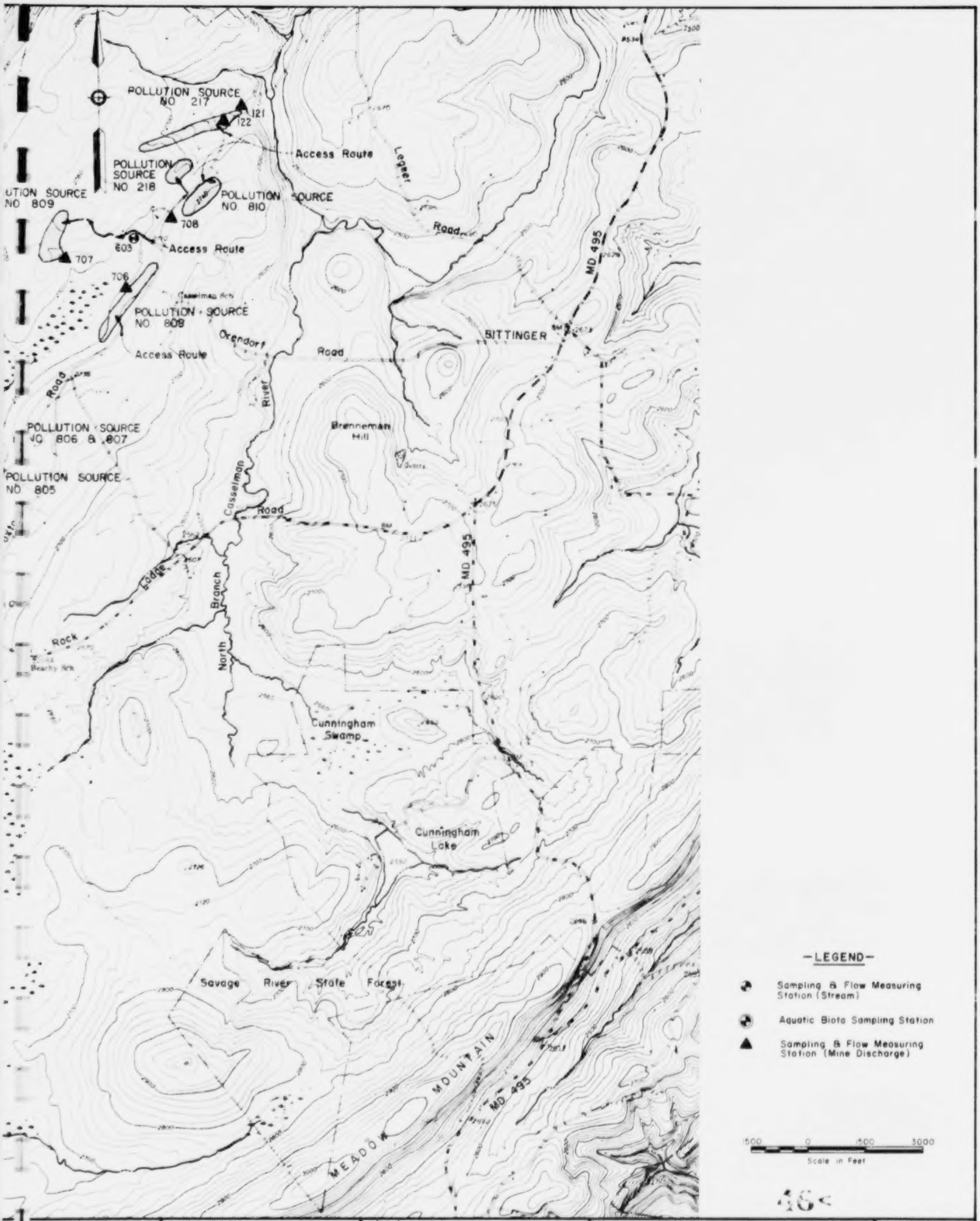
HARRISBURG, PENNSYLVANIA


US 219
George Hill
Miller Road
Callis Hill
NEGRO MOUNTAIN
POLLU
Bittinger Road
Creek
705
704
703
602
Access Route
Cherry
606
Road
POLLUTION SOURCE NO. 904
702
Access Route
700
Mosser
Bear Creek
Road
Bumble Bee Road
NEGRO MOUNTAIN
701
Lodge
Access Route
602
POLLUTION SOURCE NO 902
Rock
Rock House
604
600
Cherry Creek
605
Glades
Deep Creek Lake State Park

Prepared by

ZOLLMAN ASSOCIATES, INC.
CONSULTING ENGINEERS
BALTIMORE, MARYLAND

SKELLY & LOY
ENGINEERS - CONSULTANTS
HARRISBURG, PENNSYLVANIA



POLLUTION SOURCE NO 217
121
122
Access Route
POLLUTION SOURCE NO 218
UTION SOURCE NO 809
POLLUTION SOURCE NO 810
708
603
Access Route
707
706
Casselman Sch
POLLUTION SOURCE NO 808
Access Route
Orendorf
Road
Leger Road
MD 495
BITTINGER
Road
River
Brenneman Hill
POLLUTION SOURCE NO 806 & 807
POLLUTION SOURCE NO 805
Casselman
Road
Lodge
Rock
Beachy Sch
Branch
North
Cunningham Swamp
Cunningham Lake
Savage River State Forest
MEADOW MOUNTAIN
MD 495
-LEGEND-
Sampling & Flow Measuring Station (Stream)
Aquatic Biota Sampling Station
Sampling & Flow Measuring Station (Mine Discharge)
1500
0
1500
3000
Scale in Feet

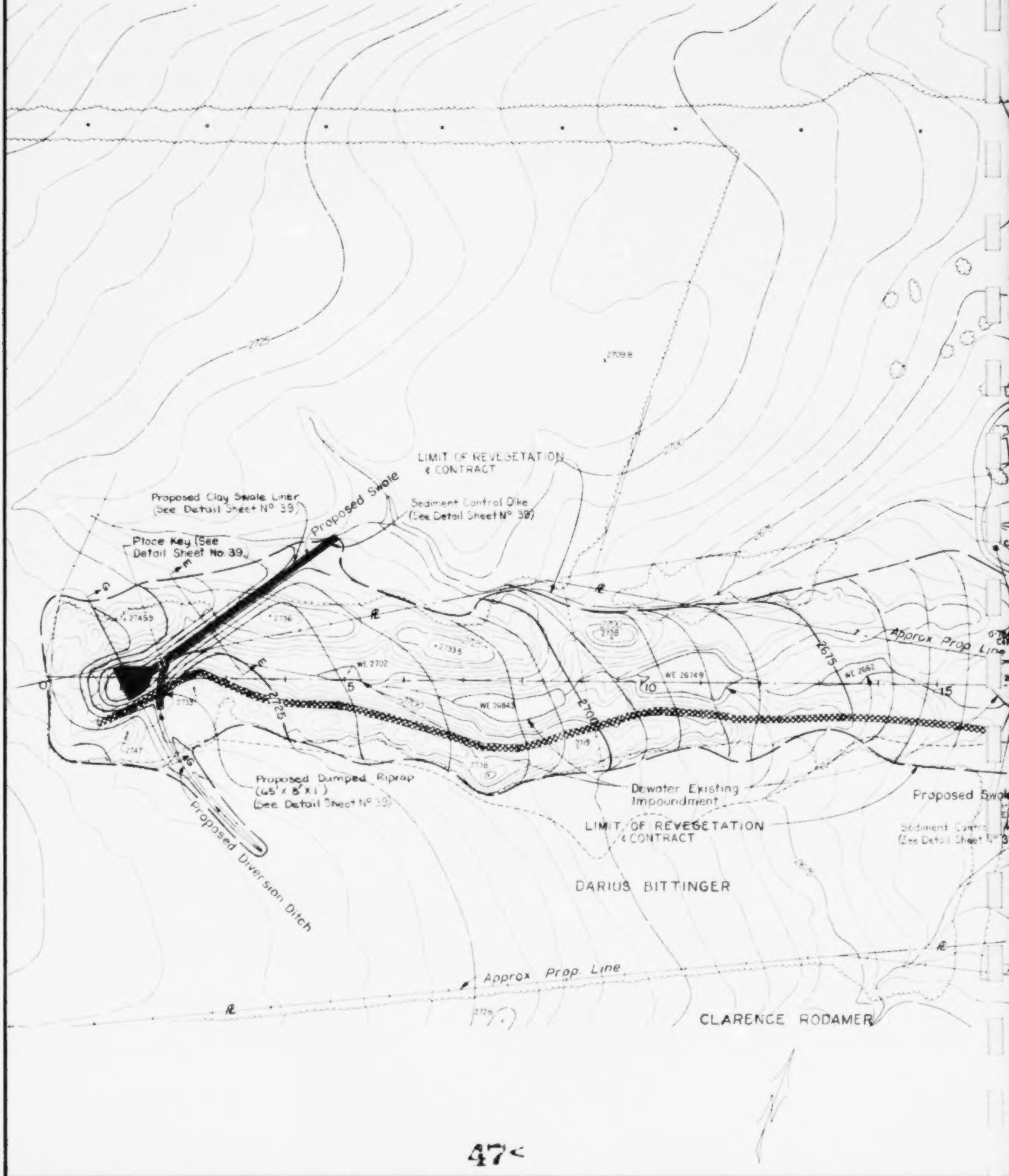
NO.	DATE	REVISIONS

VICINITY MAP

CHERRY CREEK WATERSHED

MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

PROJECT NO. FI-731
FUNDS
DATE MAY 1973
DRAWING NO.
SHEET 2 OF 39


Proposed Clay Swale Liner
(See Detail Sheet N° 39)
Place Key (See Detail Sheet No. 39)
Proposed Swale
Sediment Control Dike
(See Detail Sheet N° 39)
LIMIT OF REVEGETATION
¢ CONTRACT
2725
2709.8
2700
2675
+27459
2736
+27335
2728
WE 2702
WE 26749
WE 2662
WE 26843
2733
2747
2719
2716
0
5
10
15
Approx Prop Line
Proposed Dumped Riprap
(65' x 8' x 1)
(See Detail Sheet N° 39)
Proposed Diversion Ditch
Dewater Existing Impoundment
LIMIT OF REVEGETATION
¢ CONTRACT
Proposed Swale
Sediment Control
(See Detail Sheet N° 39
DARIUS BITTINGER
Approx Prop Line
CLARENCE RODAMER

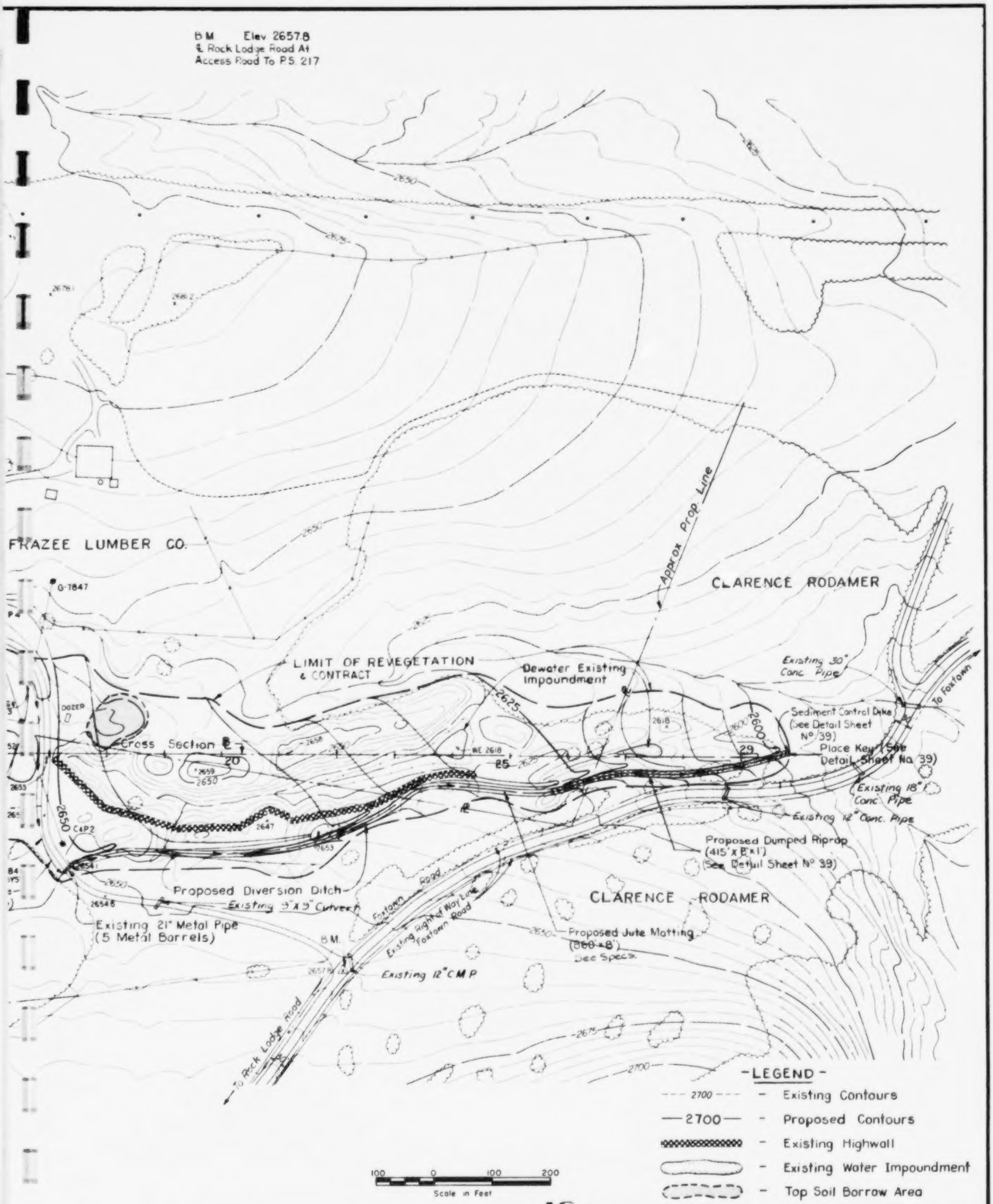
CHARLES C. ZOLLMAN

LEROY DAVID LOY, JR.

Prepared by

ZOLLMAN ASSOCIATES, INC.
CONSULTING ENGINEERS
BALTIMORE, MARYLAND

SKELLY & LOY
ENGINEERS - CONSULTANTS
HARRISBURG, PENNSYLVANIA


B M Elev. 2657.8
℄ Rock Lodge Road At
Access Road To P.S. 217
2650
2625
2678.1
2681.2
2650
FRAZEE LUMBER CO.
G-7847
Approx. Prop. Line
CLARENCE RODAMER
2625
LIMIT OF REVEGETATION & CONTRACT
Dewater Existing Impoundment
2625
DOZER
Cross Section ℄
20
2659
2650
2658
WE 2618
25
2618
2600
2600
29
Existing 30" Conc. Pipe
Sediment Control Dike (See Detail Sheet Nº 39)
Place Key (See Detail Sheet No. 39)
To Foxtown
Existing 18" Conc. Pipe
Existing 12" Conc. Pipe
2650
C&P2
2647
2653
2654
Proposed Dumped Riprap (415' x 8' x 1') (See Detail Sheet Nº 39)
Proposed Diversion Ditch
Existing 9' x 9' Culvert
2654.6
Foxtown Road
Existing Right of Way Line Foxtown Road
CLARENCE RODAMER
Existing 21" Metal Pipe (5 Metal Barrels)
B.M.
2657.8
Existing 12" CMP
Proposed Jute Matting (860' x 8') See Specs.
2650
To Rock Lodge Road
2675
2700
-LEGEND-
2700 - Existing Contours
2700 - Proposed Contours
- Existing Highwall
- Existing Water Impoundment
- Top Soil Borrow Area
- Proposed Clay Swale Liner
100 0 100 200
Scale in Feet

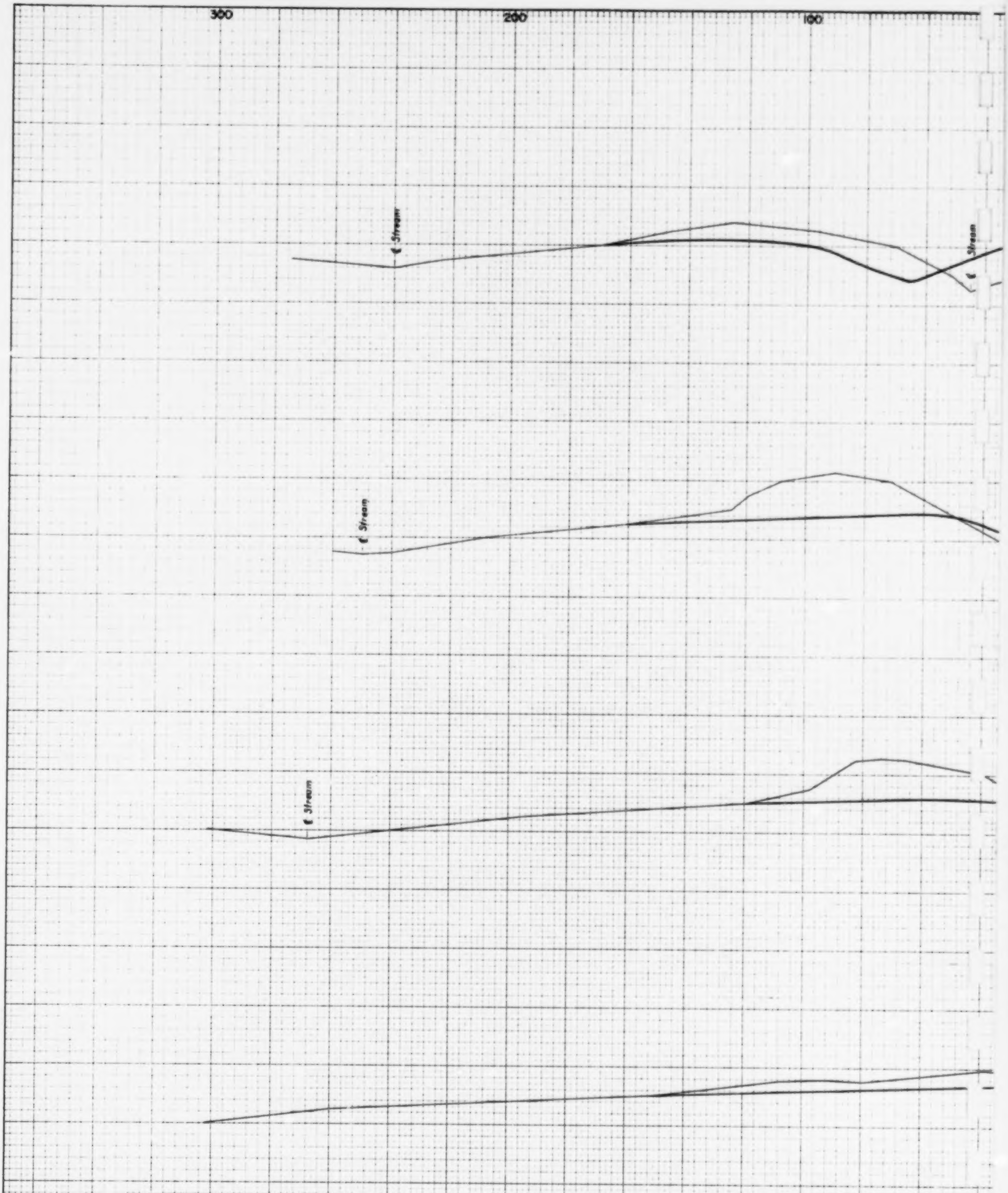
6/19/73 Keith C Kelly

NO.	DATE	REVISIONS

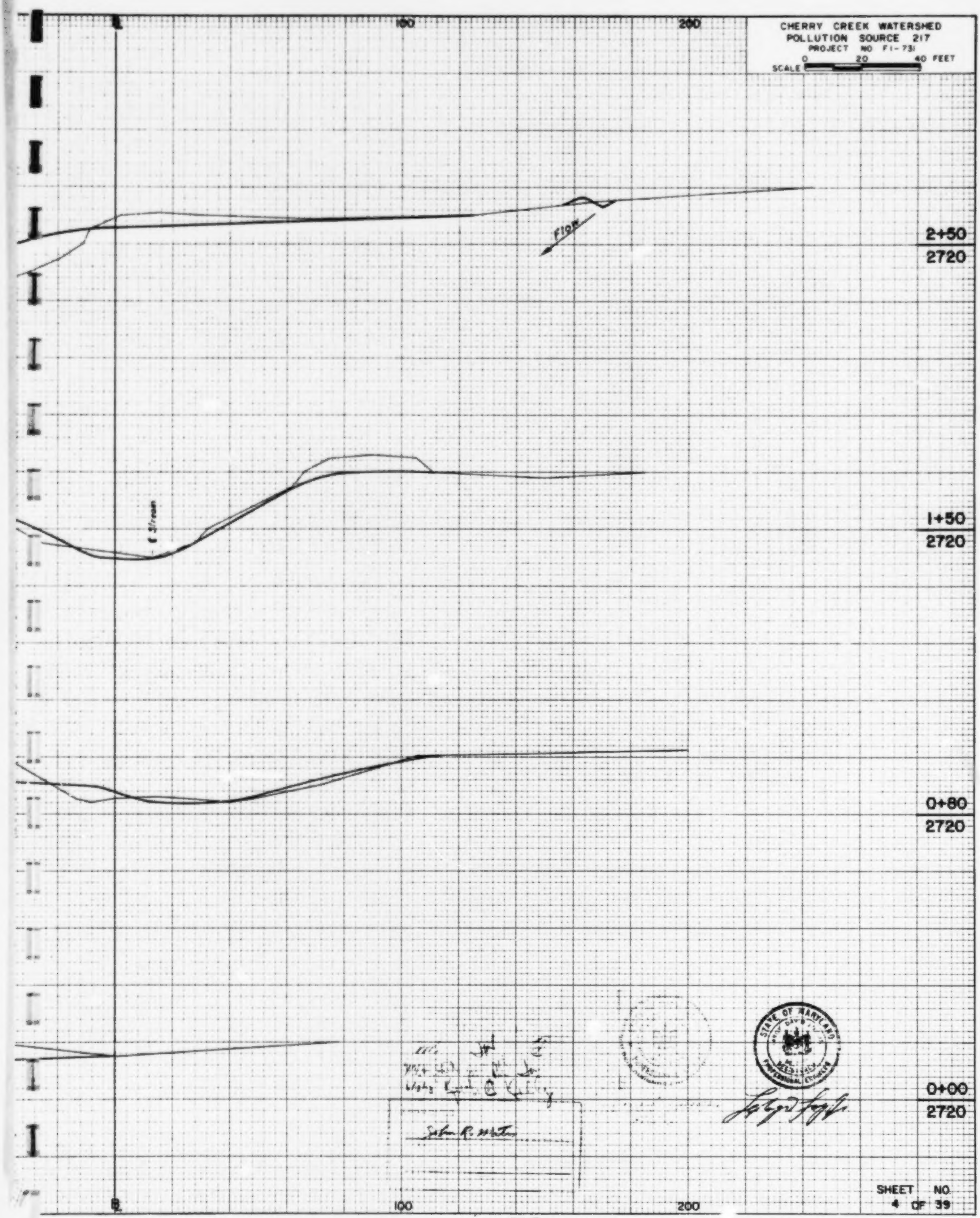
POLLUTION SOURCE NO. 217
PLAN

CHERRY CREEK WATERSHED
MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

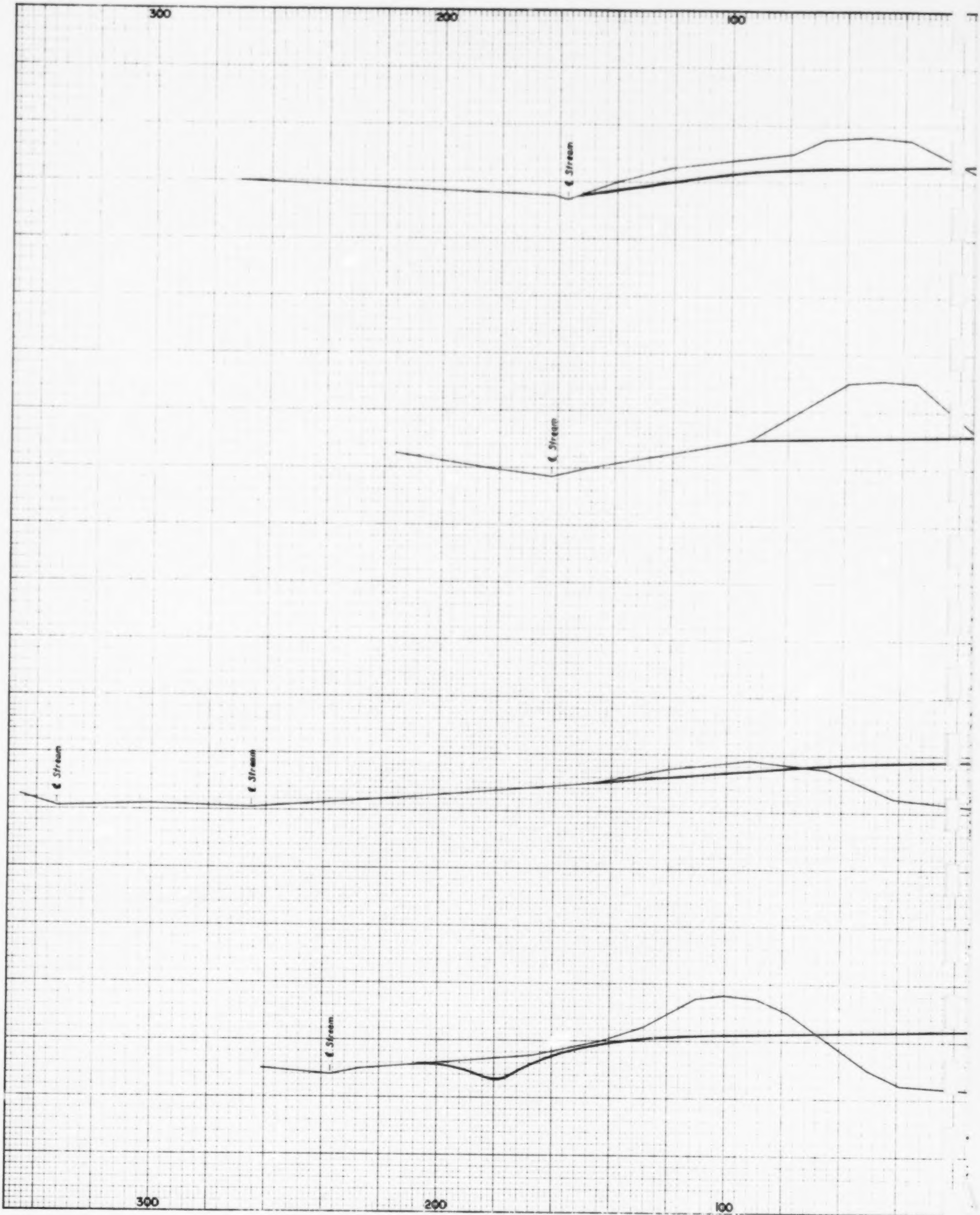
PROJECT NO. F1-731
FUNDS
DATE MAY 1973
DRAWING NO.
SHEET 3 OF 39


300
200
100
℄ Stream
℄ Stream
℄ Stream
℄ Stream
300
200
100

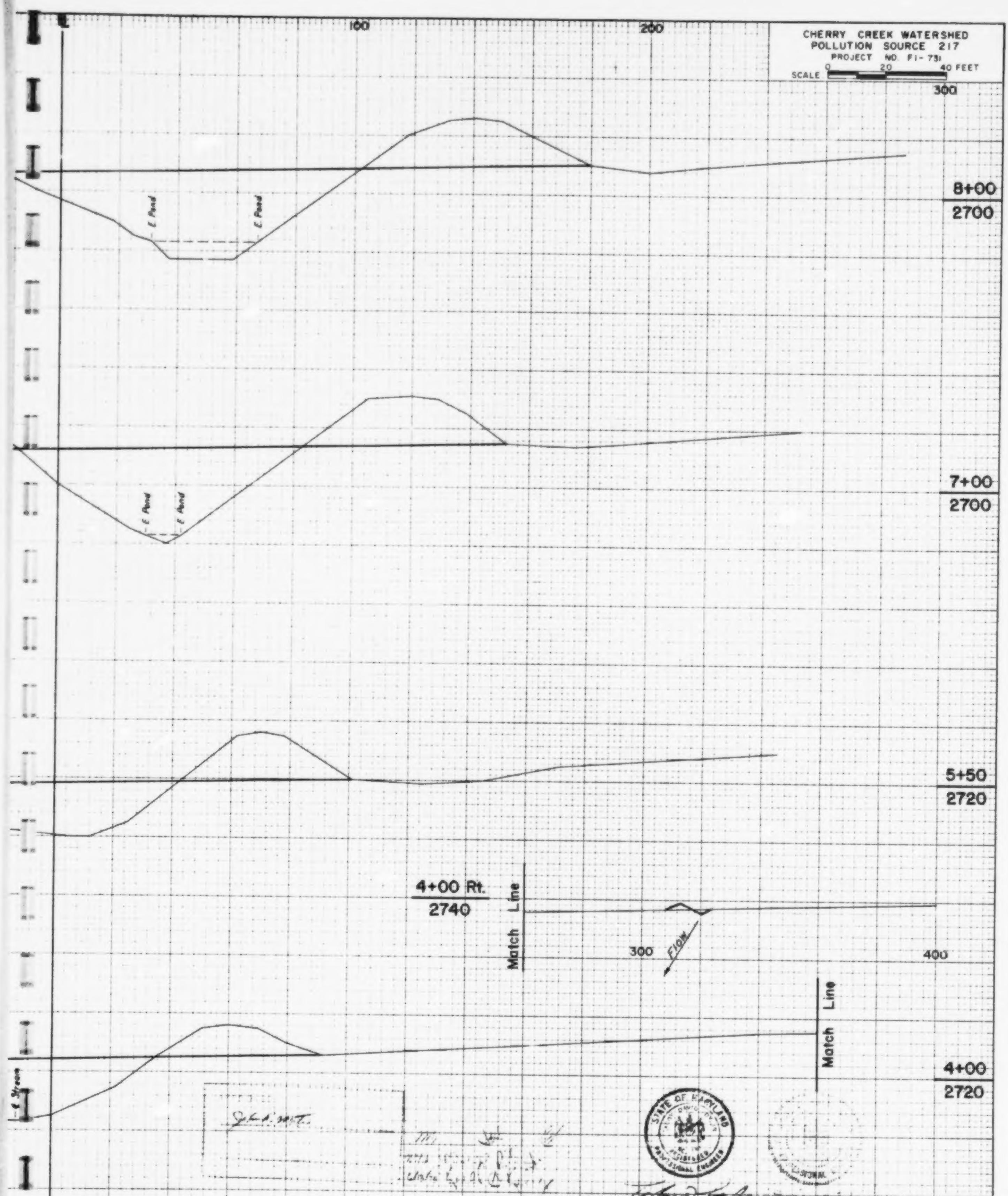
CHERRY CREEK WATERSHED
POLLUTION SOURCE 217
PROJECT NO F1-731


SCALE
0
20
40 FEET
℄
100
200
Flow
℄ Stream
2+50
2720
1+50
2720
0+80
2720
0+00
2720
℄
100
200

SHEET NO.
4 OF 39

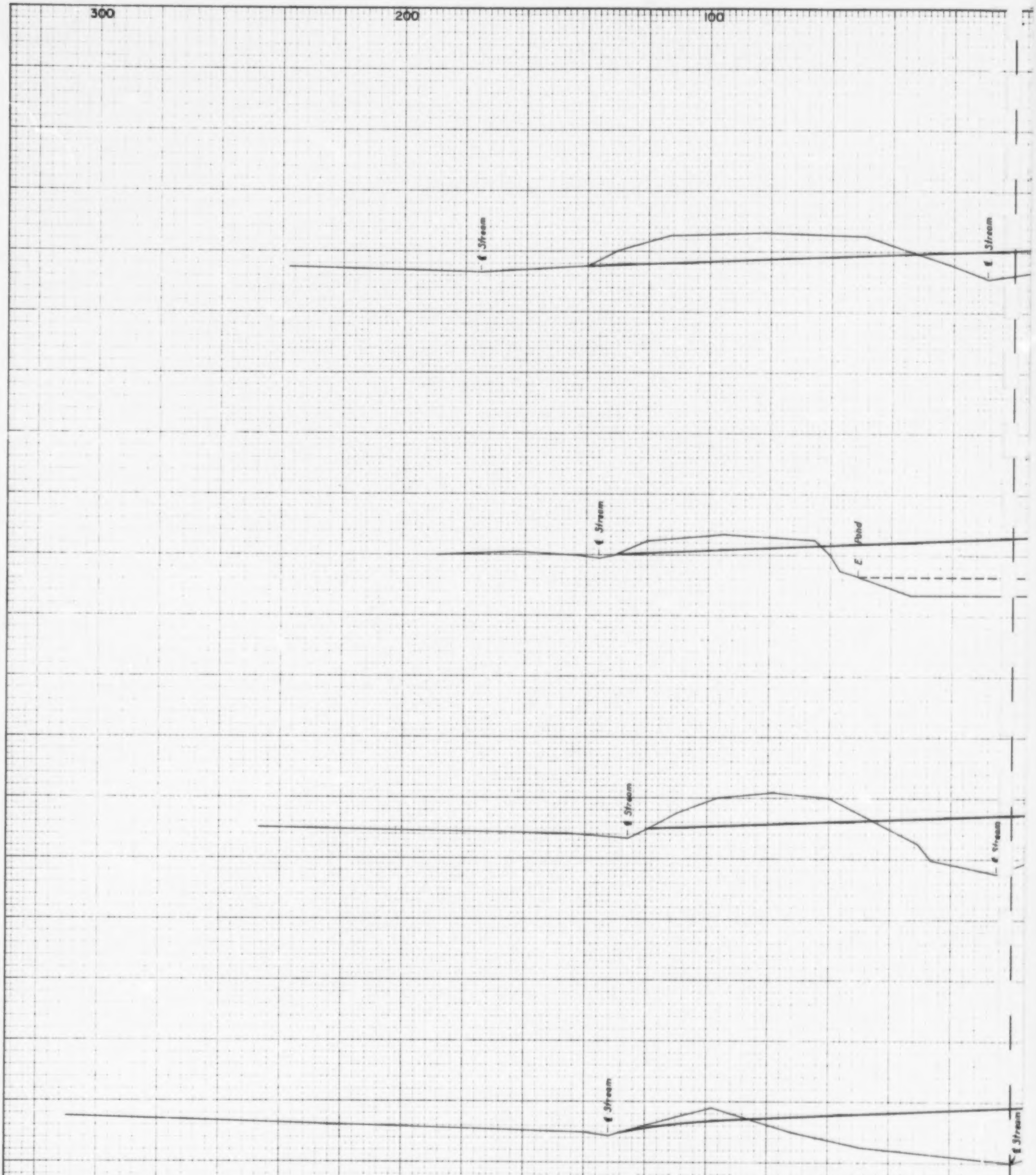

300
200
100
℄ Stream
℄ Stream
℄ Stream
℄ Stream
℄ Stream
300
200
100

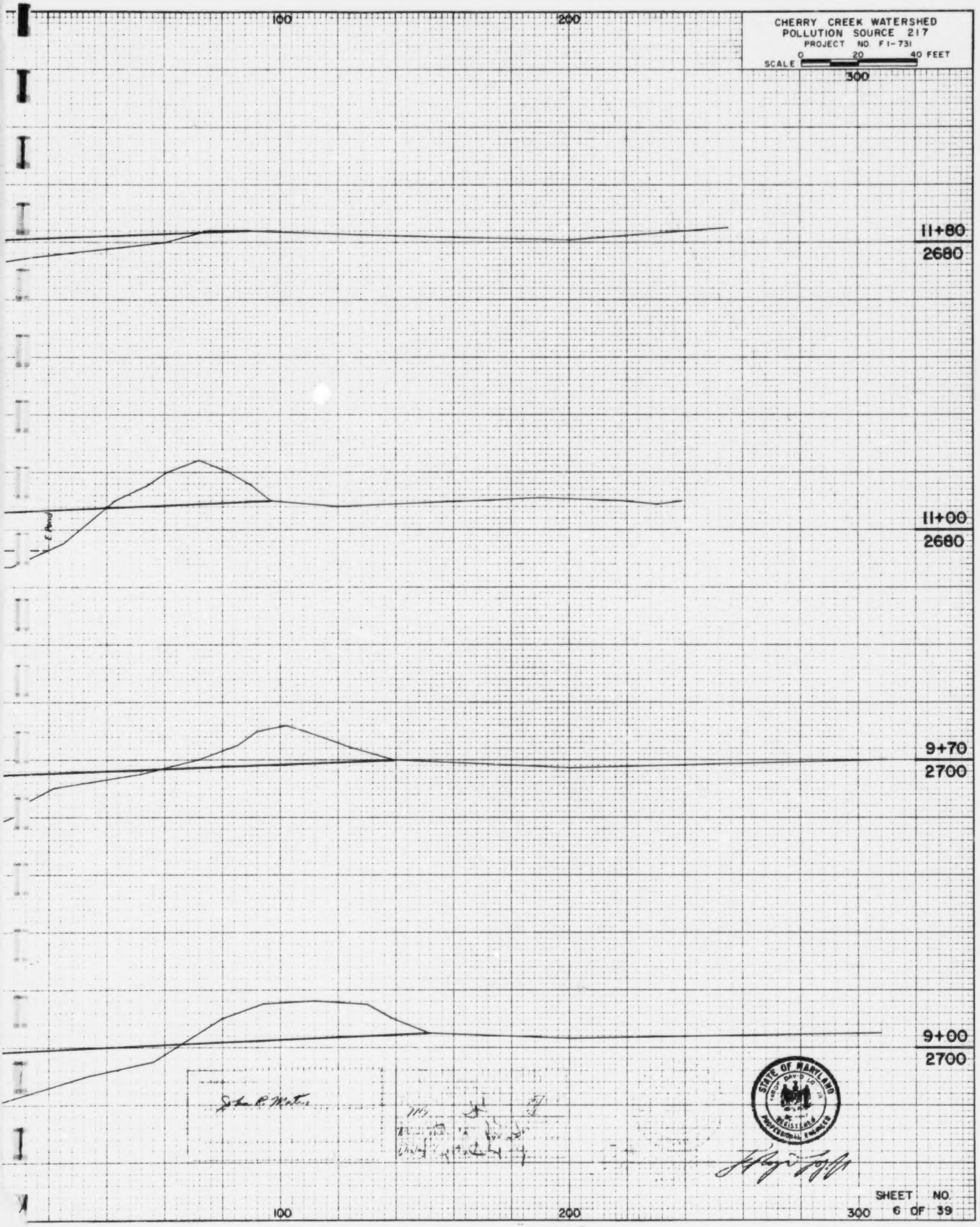
CHERRY CREEK WATERSHED
POLLUTION SOURCE 217
PROJECT NO. FI-731



SCALE 0 20 40 FEET
℄
100
200
300
E Pond
E Pond
8+00
2700
E Pond
E Pond
7+00
2700
5+50
2720
4+00 Rt.
2740
Match Line
300
Flow
400
Match Line
℄ Stream
4+00
2720
℄
100
200
300

SHEET NO.
5 OF 39

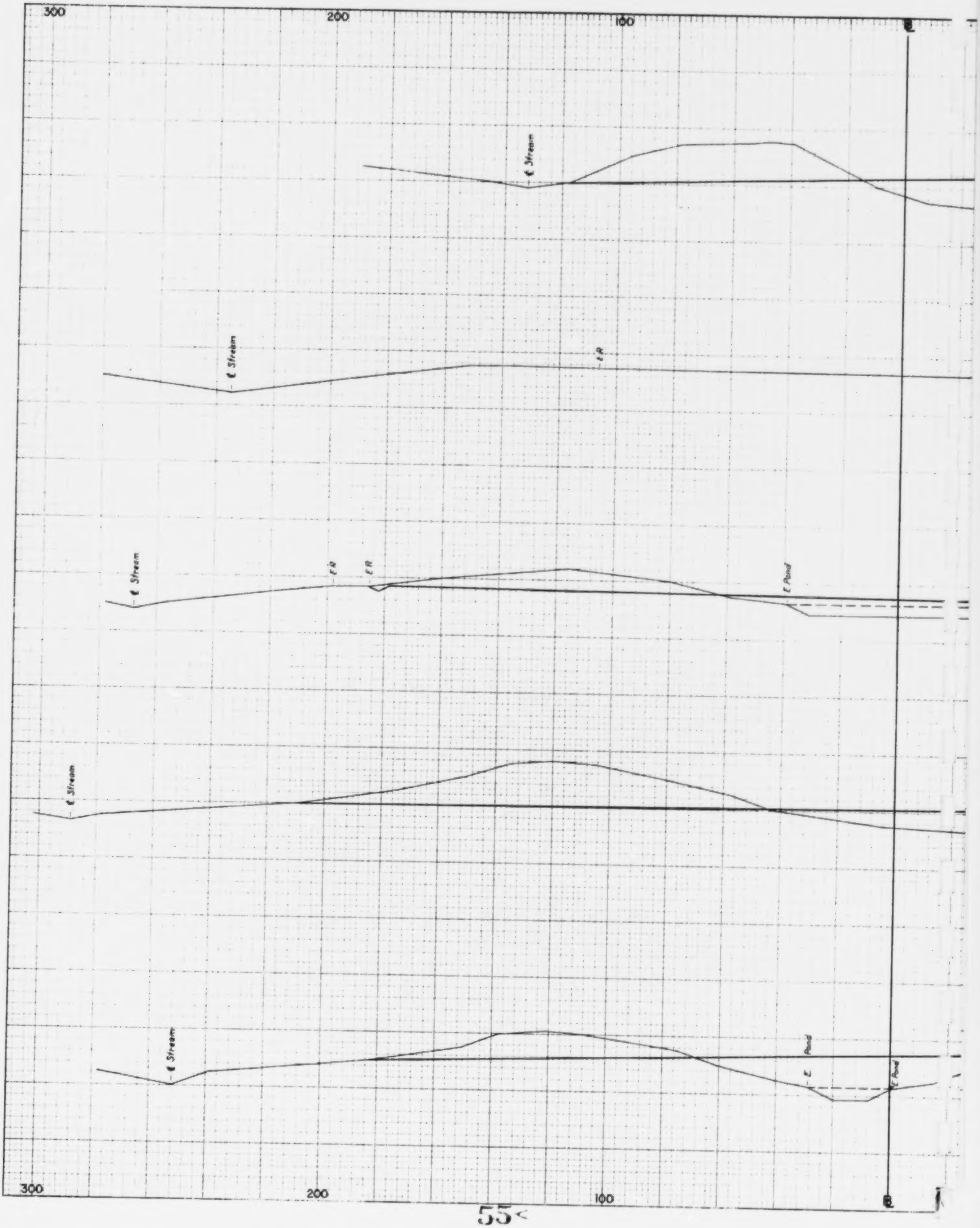

300
200
100
℄ Stream
℄ Stream
℄ Stream
℄ Pond
E
℄ Stream
℄ Stream
℄ Stream
℄ Stream
300
200
100


100
200
300
11+80
2680
E. Pond
11+00
2680
9+70
2700
9+00
2700
100
200
300

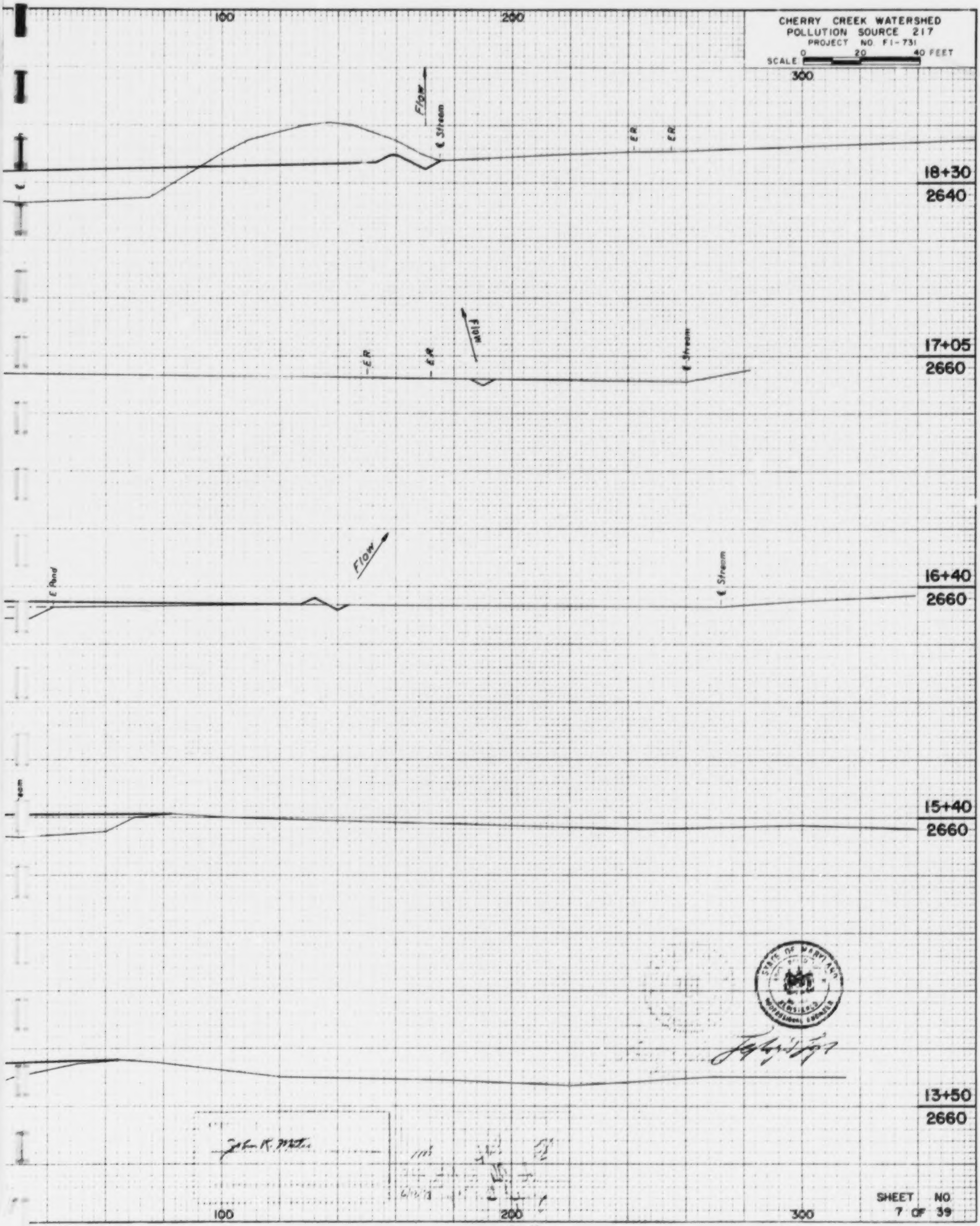
CHERRY CREEK WATERSHED
POLLUTION SOURCE 217
PROJECT NO. F1-731

SCALE 0 20 40 FEET

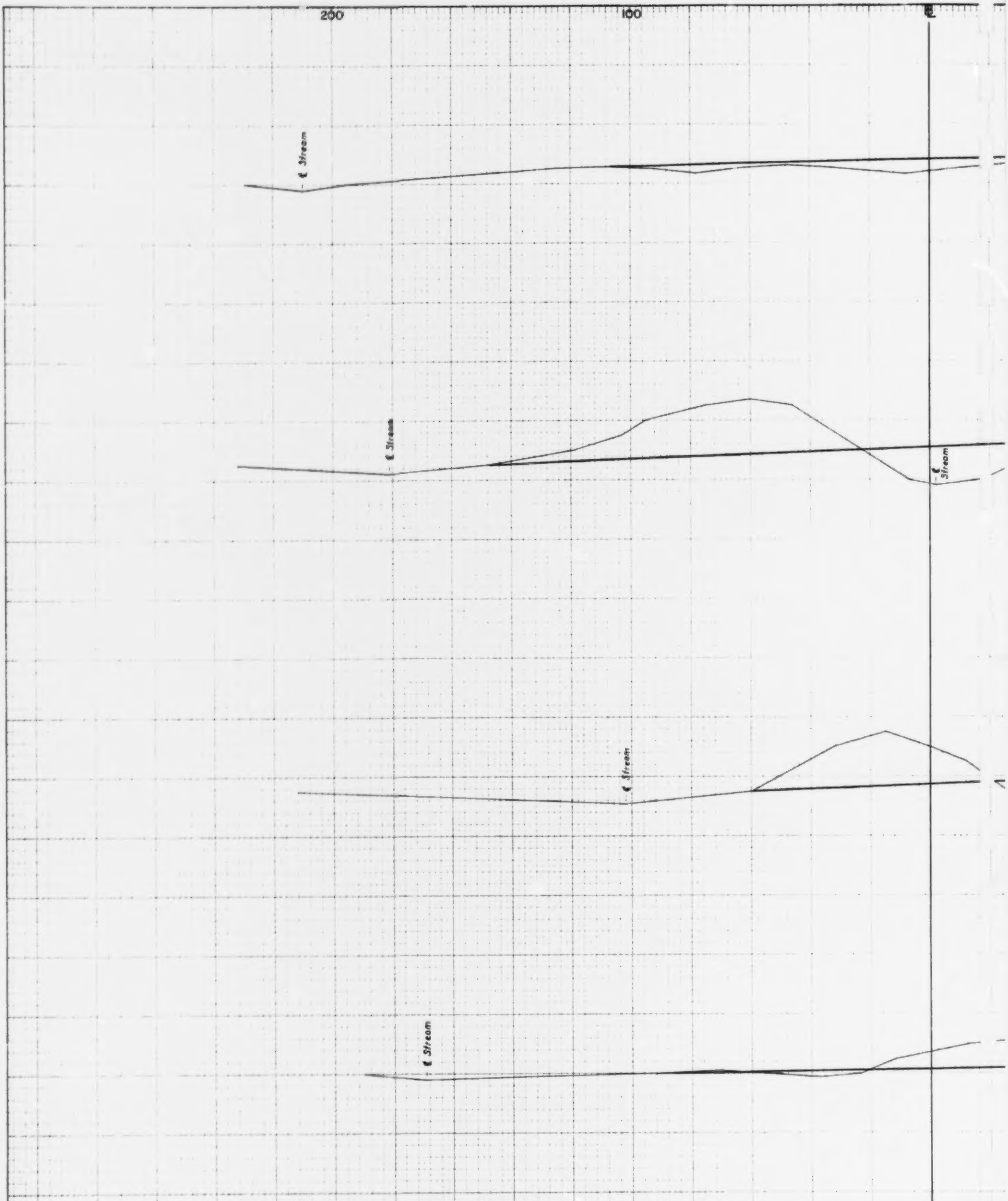
SHEET NO.
6 OF 39

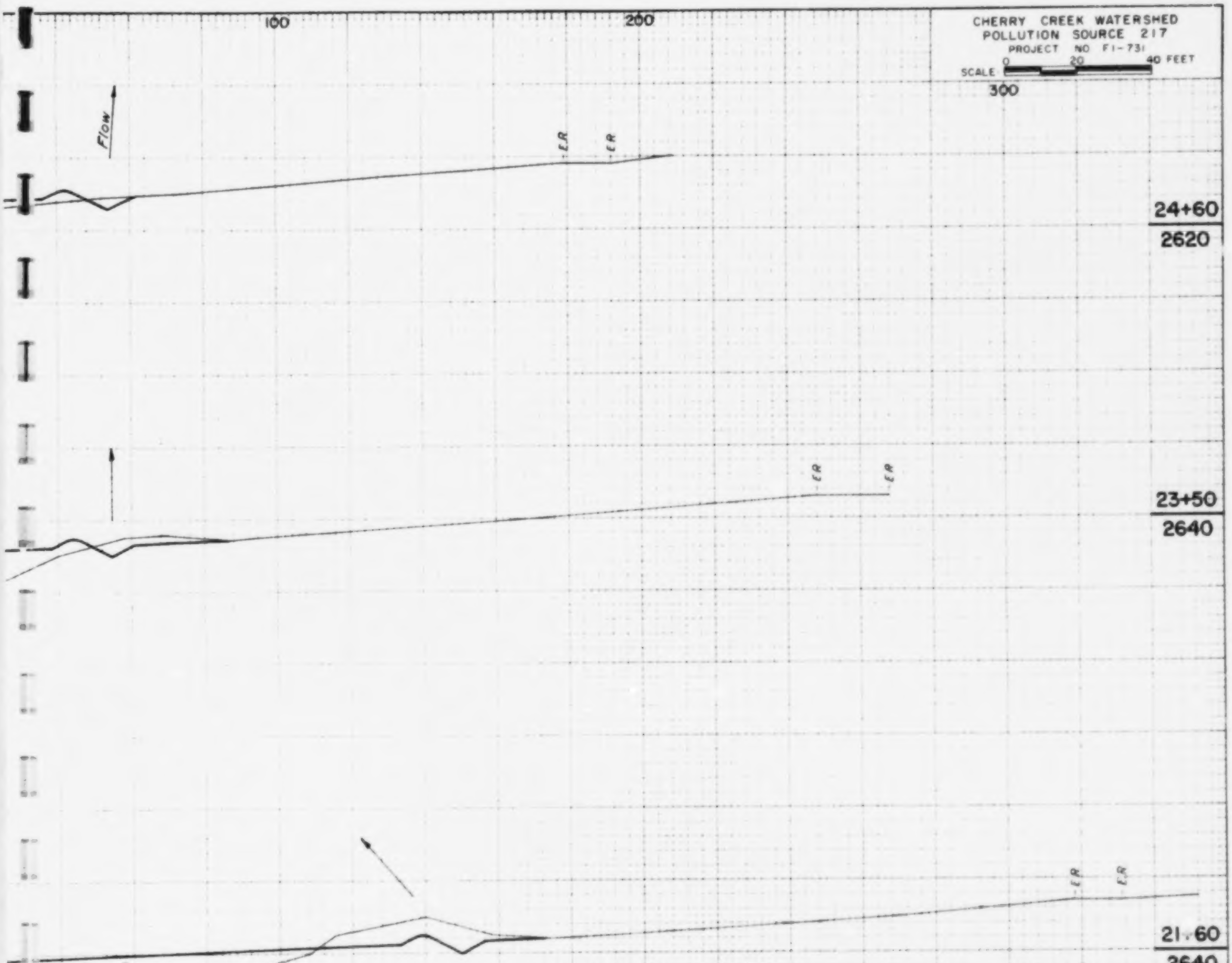

300
200
100
℄
℄ Stream
℄ Stream
E R
℄ Stream
E R
E R
℄ Pond
℄ Stream
℄ Stream
Pond
℄
℄ Pond
300
200
100
℄

CHERRY CREEK WATERSHED
POLLUTION SOURCE 217
PROJECT NO. F1-731


SCALE 0 20 40 FEET
100
200
300
Flow
℄ Stream
E.R.
E.R.
18+30
2640
E.R.
E.R.
Flow
℄ Stream
17+05
2660
℄ Pond
Flow
℄ Stream
16+40
2660
15+40
2660
13+50
2660
100
200
300

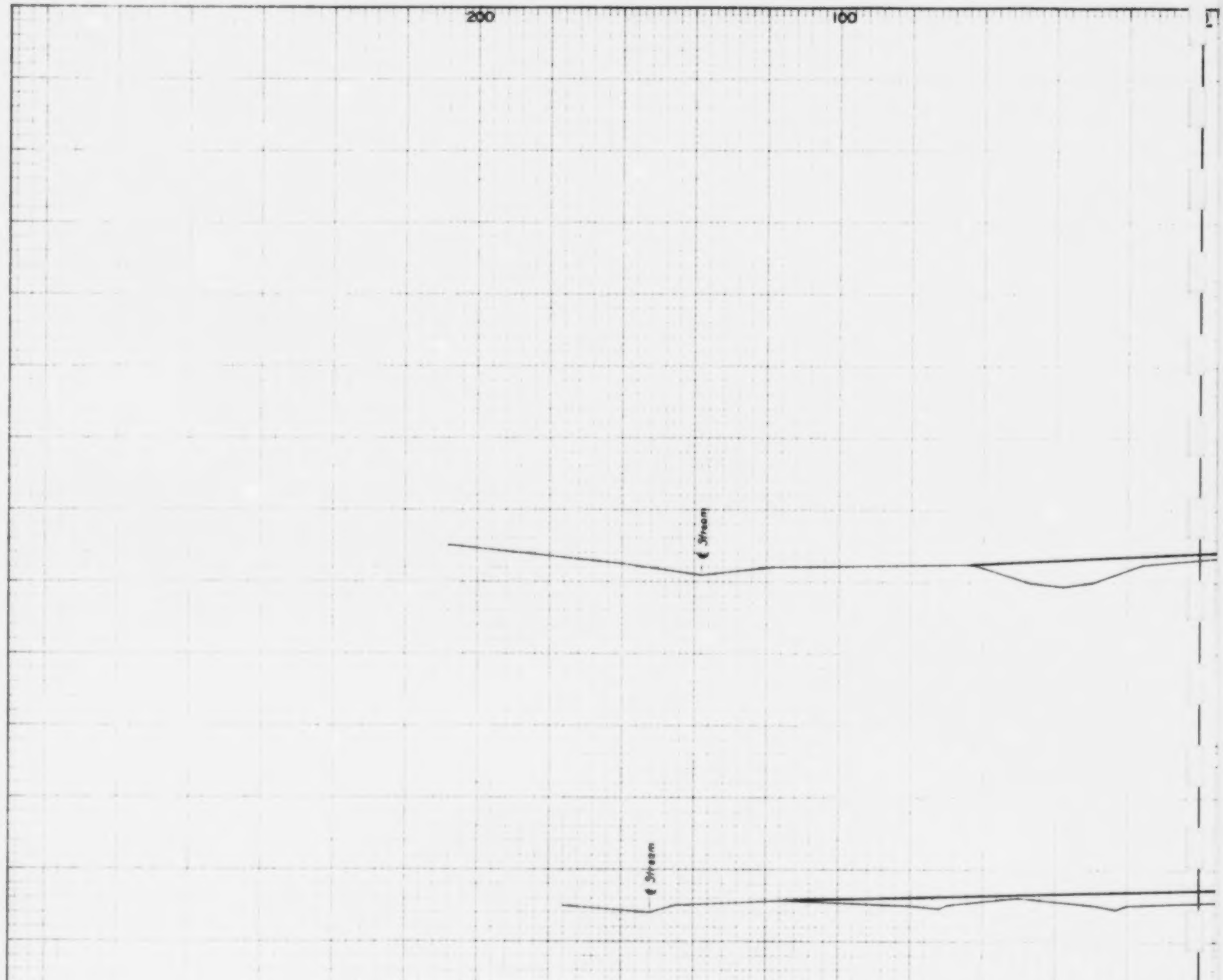
SHEET NO.
7 OF 39


200
100
℄
℄ Stream
℄ Stream
℄ Stream
℄ Stream
℄ Stream
200
100
℄

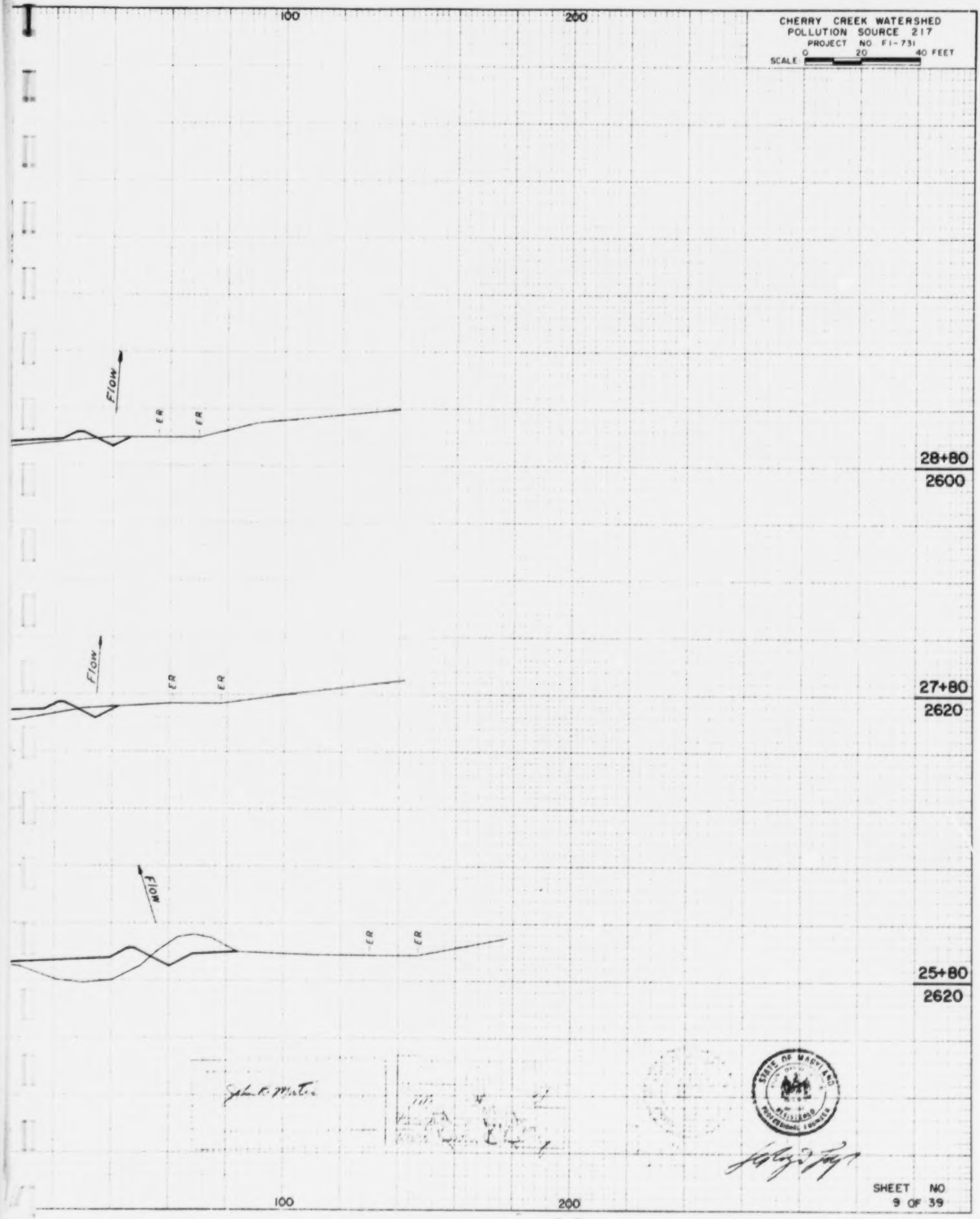

100
200
300
Flow
E.R.
E.R.
24+60
2620
E.R.
E.R.
23+50
2640
E.R.
E.R.
21+60
2640
℄ Stream
Flow
E.R.
E.R.
19+80
2640
℄ Stream
100
200
300

CHERRY CREEK WATERSHED
POLLUTION SOURCE 217
PROJECT NO F1-731
SCALE 0 20 40 FEET

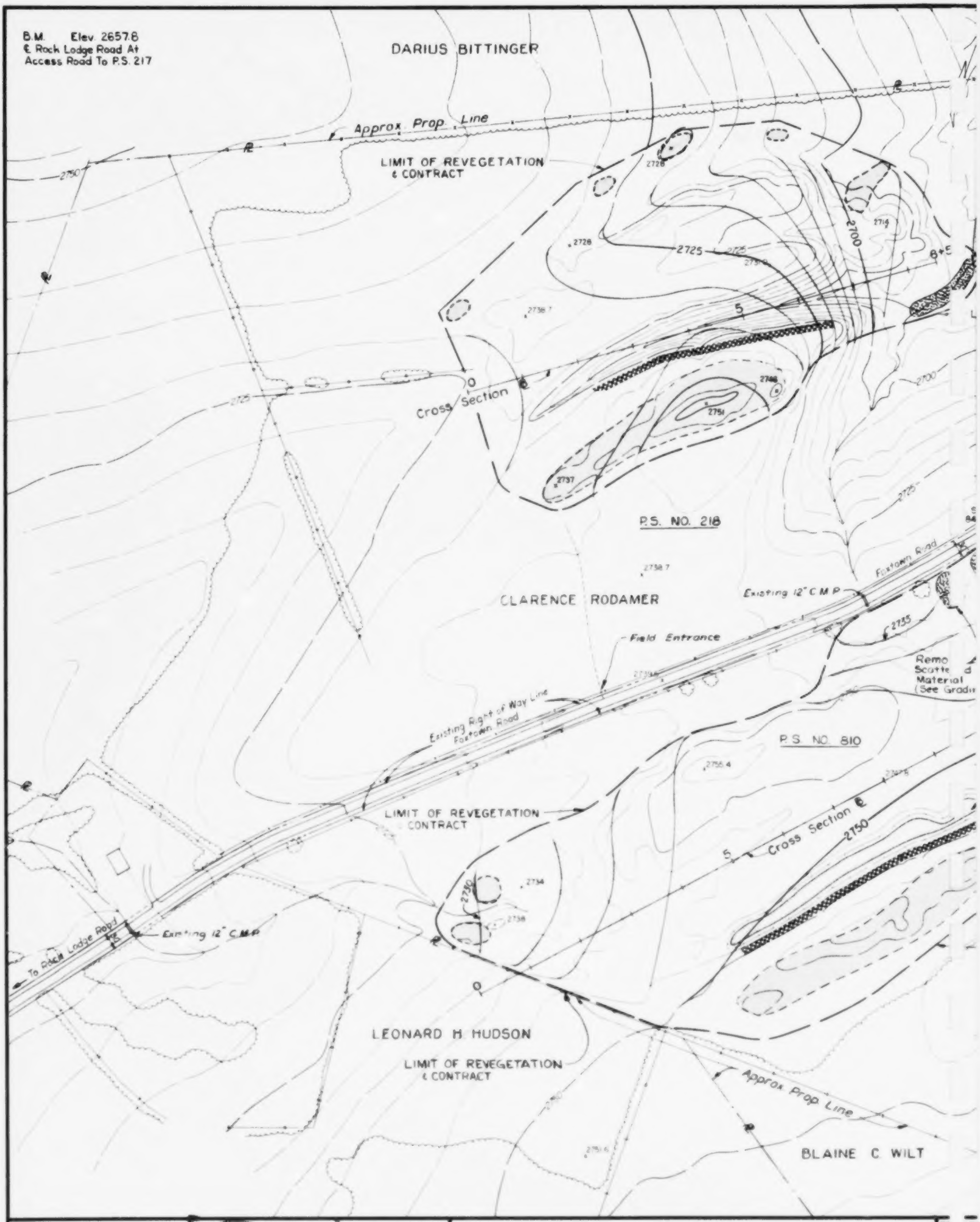
SHEET NO
8 OF 39


200
100
℄ Stream
℄ Stream
℄ Stream
200
100

CHERRY CREEK WATERSHED
POLLUTION SOURCE 217
PROJECT NO. F1-731
SCALE 0 20 40 FEET


100
200
FLOW
ER
ER
28+80
2600
FLOW
ER
ER
27+80
2620
FLOW
ER
ER
25+80
2620
100
200

SHEET NO
9 OF 39



B.M. Elev. 2657.8
℄ Rock Lodge Road At
Access Road To P.S. 217
DARIUS BITTINGER
Approx. Prop. Line
LIMIT OF REVEGETATION
& CONTRACT
2750
2728
2725
2700
2719
2728
2738.7
5
2748
2751
2737
Cross Section ℄
2725
2700
2725
P.S. NO. 218
2738.7
CLARENCE RODAMER
Existing 12" C.M.P.
Foxtown Road
2735
Field Entrance
Remo
Scatte d
Material
(See Gradi
Existing Right of Way Line
Foxtown Road
P.S. NO. 810
2755.4
LIMIT OF REVEGETATION
& CONTRACT
5
Cross Section ℄
2750
2730
2734
2736
To Rock Lodge Road
Existing 12" C.M.P.
LEONARD H. HUDSON
LIMIT OF REVEGETATION
& CONTRACT
Approx. Prop. Line
2751.6
BLAINE C. WILT

Charles C. Zollman

8/4/77

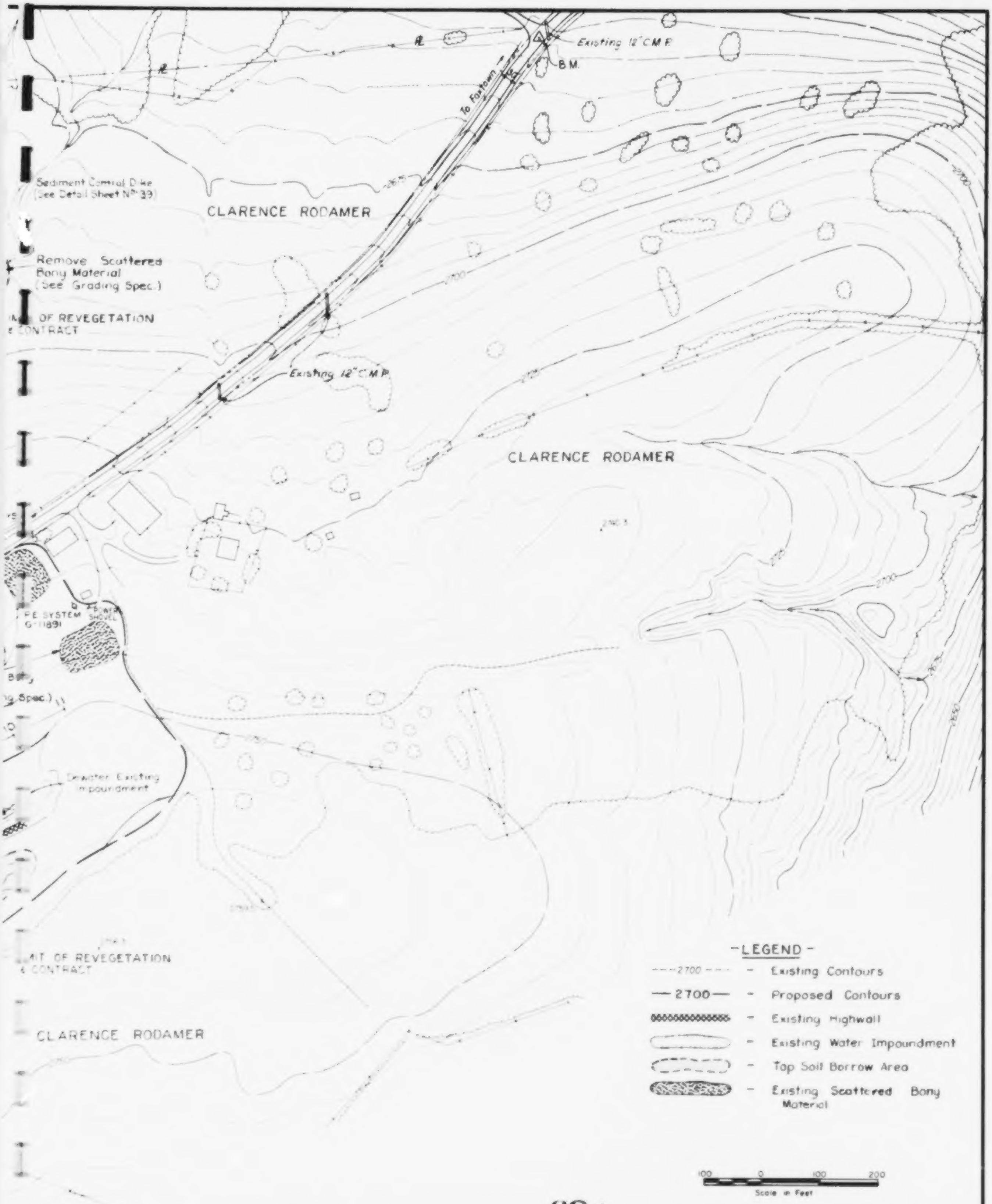
Leroy David Loy, Jr.

61

Prepared by

ZOLLMAN ASSOCIATES, INC.
CONSULTING ENGINEERS
BALTIMORE, MARYLAND

SKELLY & LOY
ENGINEERS – CONSULTANTS
HARRISBURG, PENNSYLVANIA

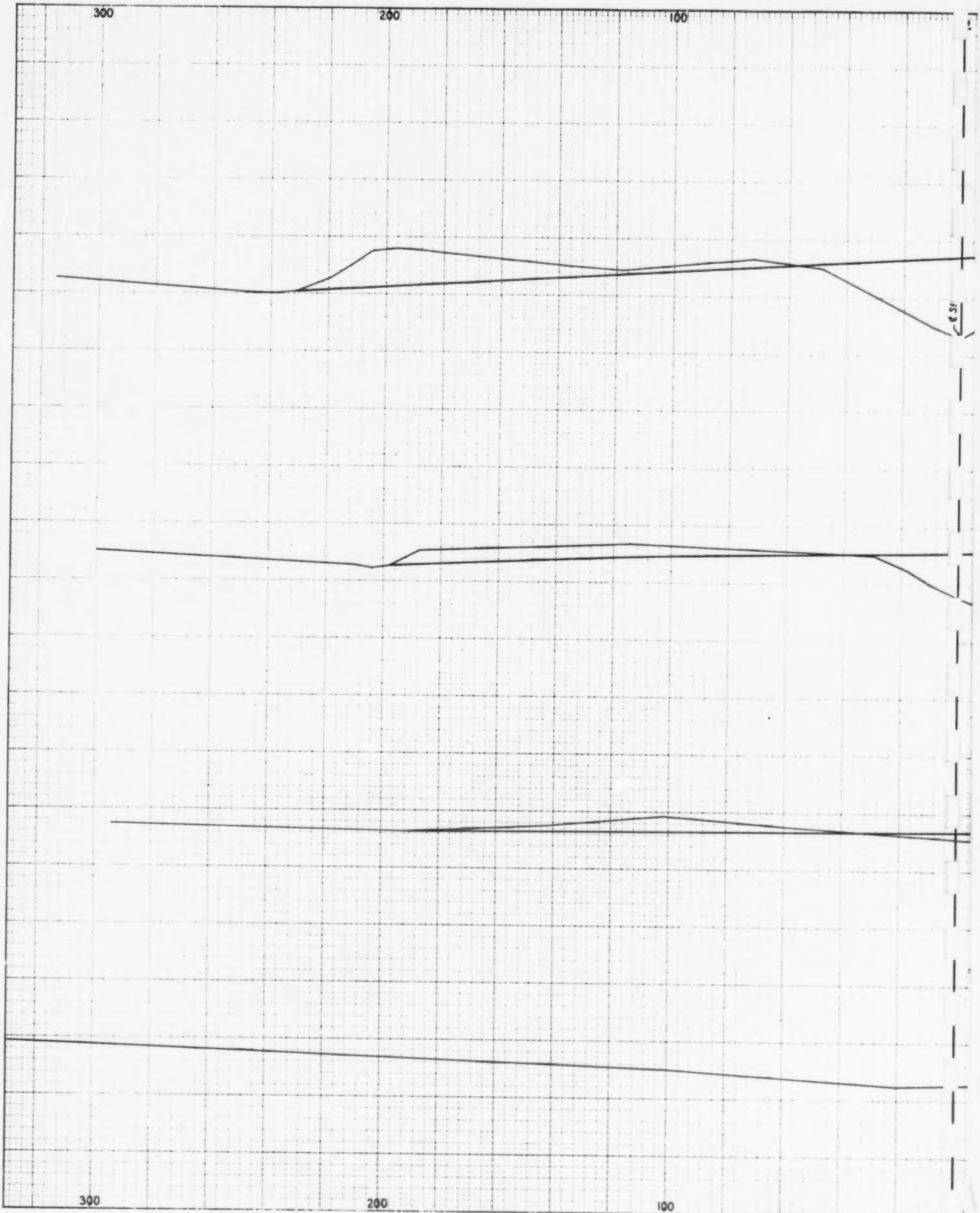

Existing 12" C.M.P.
B.M.
To Foxtown
Sediment Control Dike
(See Detail Sheet No. 39)
CLARENCE RODAMER
2675
Remove Scattered
Bony Material
(See Grading Spec.)
MIT OF REVEGETATION
CONTRACT
2700
Existing 12" C.M.P.
2725
2700
CLARENCE RODAMER
2710.3
2725
2700
2675
2650
P.E. SYSTEM
G-11891
POWER
SHOVEL
Dewater Existing
Impoundment
MIT OF REVEGETATION
CONTRACT
CLARENCE RODAMER
-LEGEND-
---2700--- - Existing Contours
—2700— - Proposed Contours
- Existing Highwall
- Existing Water Impoundment
- Top Soil Borrow Area
- Existing Scattered Bony Material
100 0 100 200
Scale in Feet

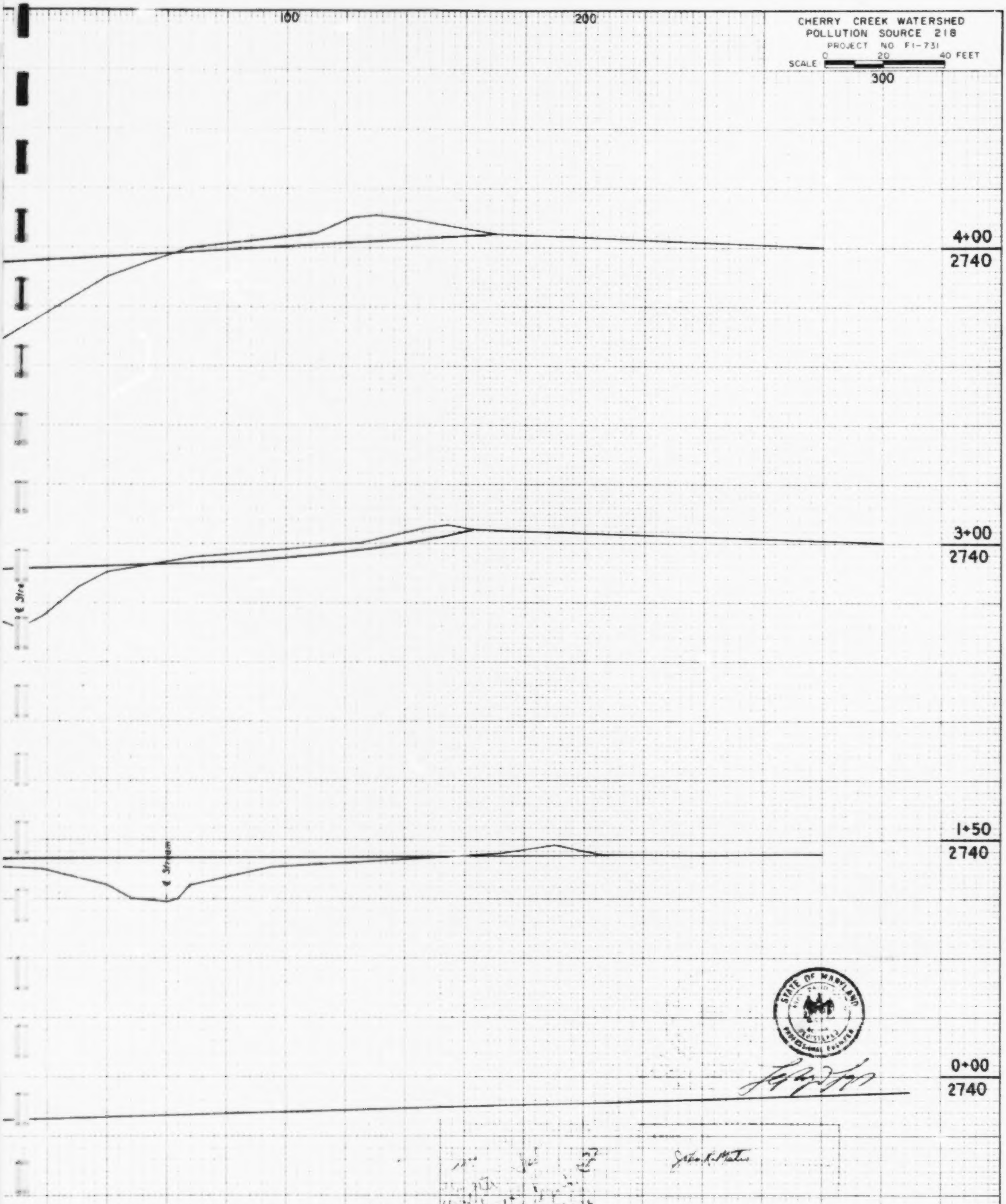
NO.	DATE	REVISIONS

POLLUTION SOURCE NOS. 218 & 810
PLAN

CHERRY CREEK WATERSHED
MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

PROJECT NO. FI-731
FUNDS
DATE MAY 1973
DRAWING NO.
SHEET 10 OF 39

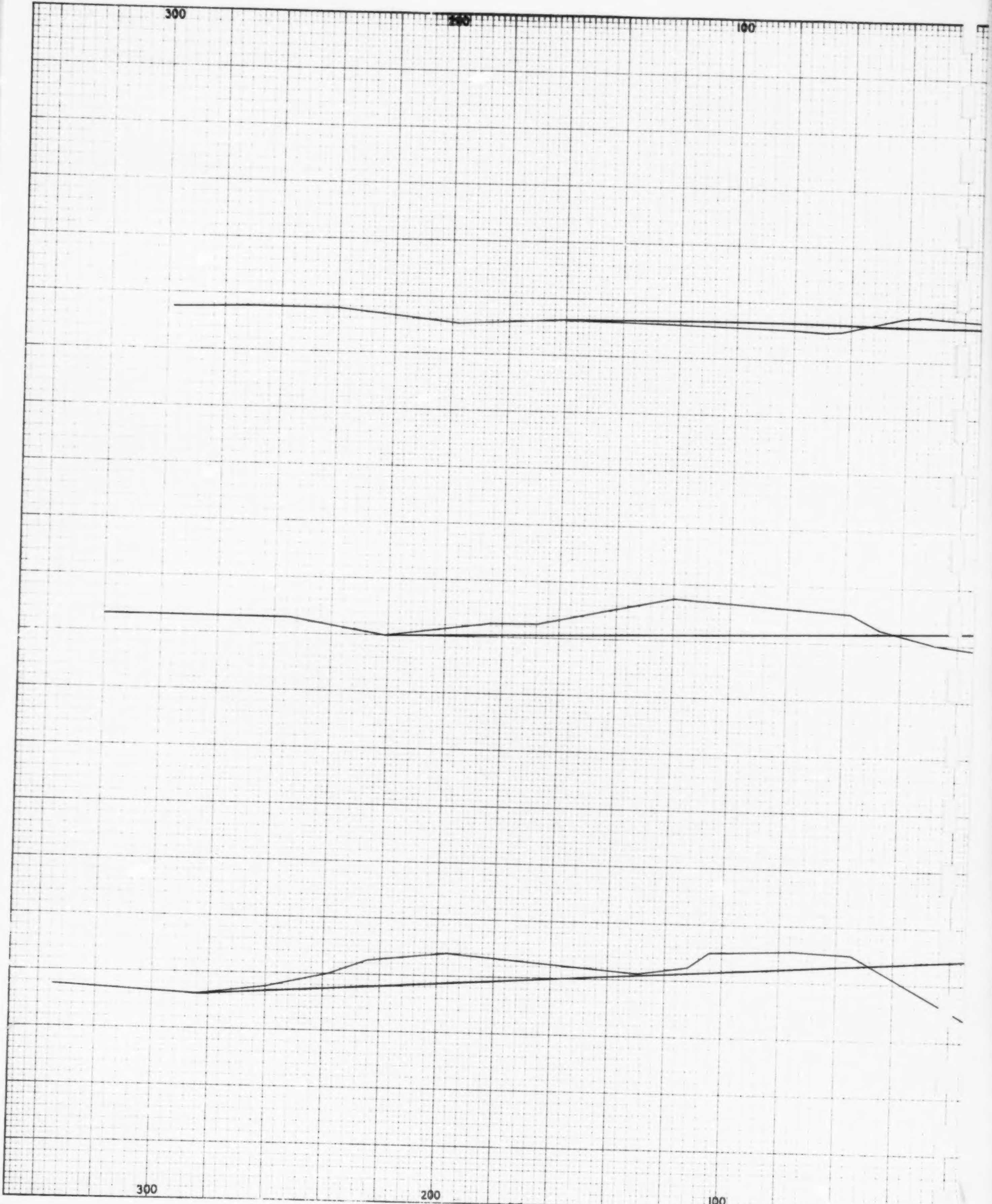

300
200
100
℄ 51
300
200
100

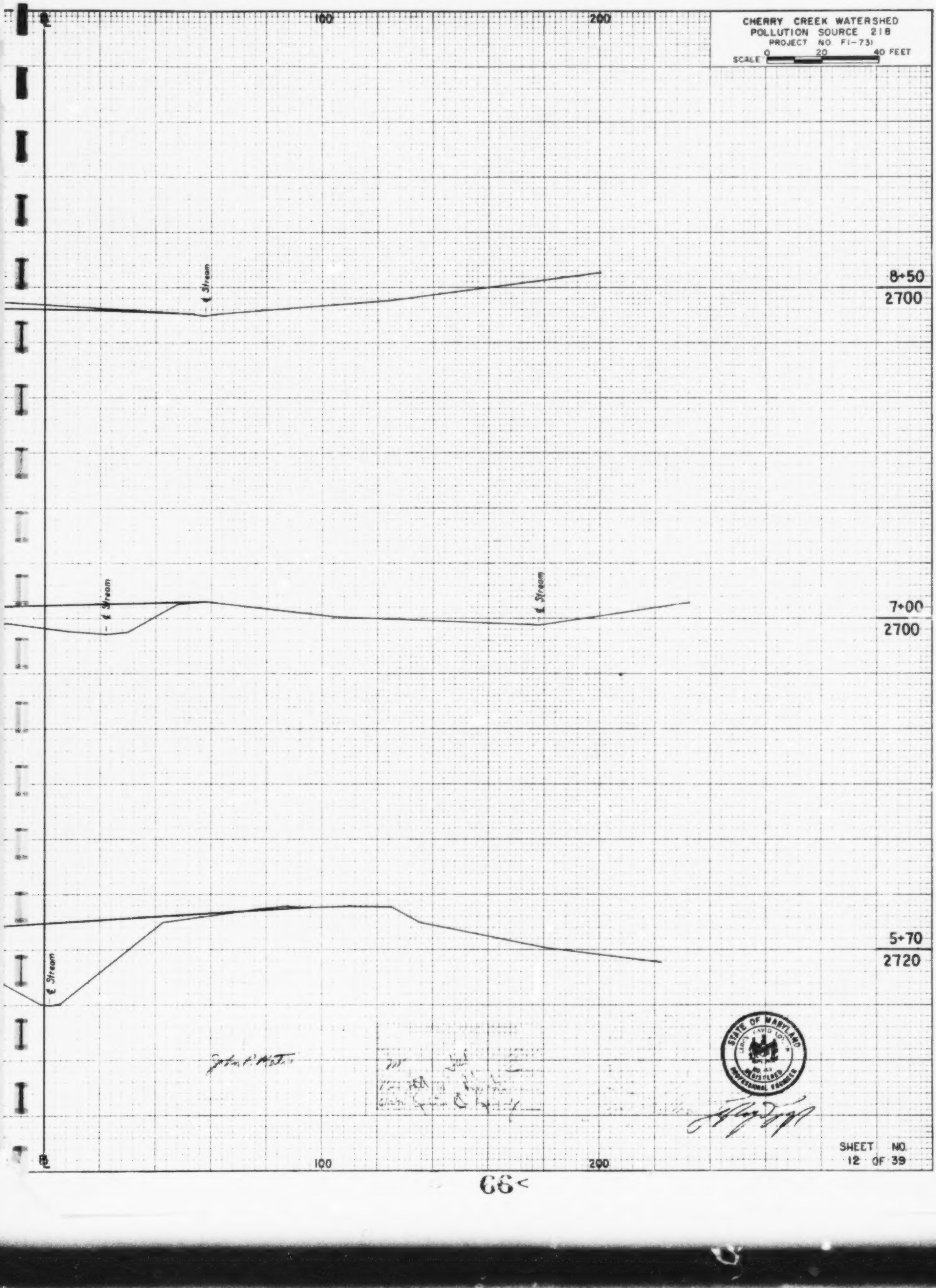


CHERRY CREEK WATERSHED
POLLUTION SOURCE 218
PROJECT NO F1-731

SCALE
0
20
40 FEET
100
200
300
4+00
2740
3+00
2740
℄ Stre
1+50
2740
℄ Stream
0+00
2740
100
200
300

SHEET NO
11 OF 39

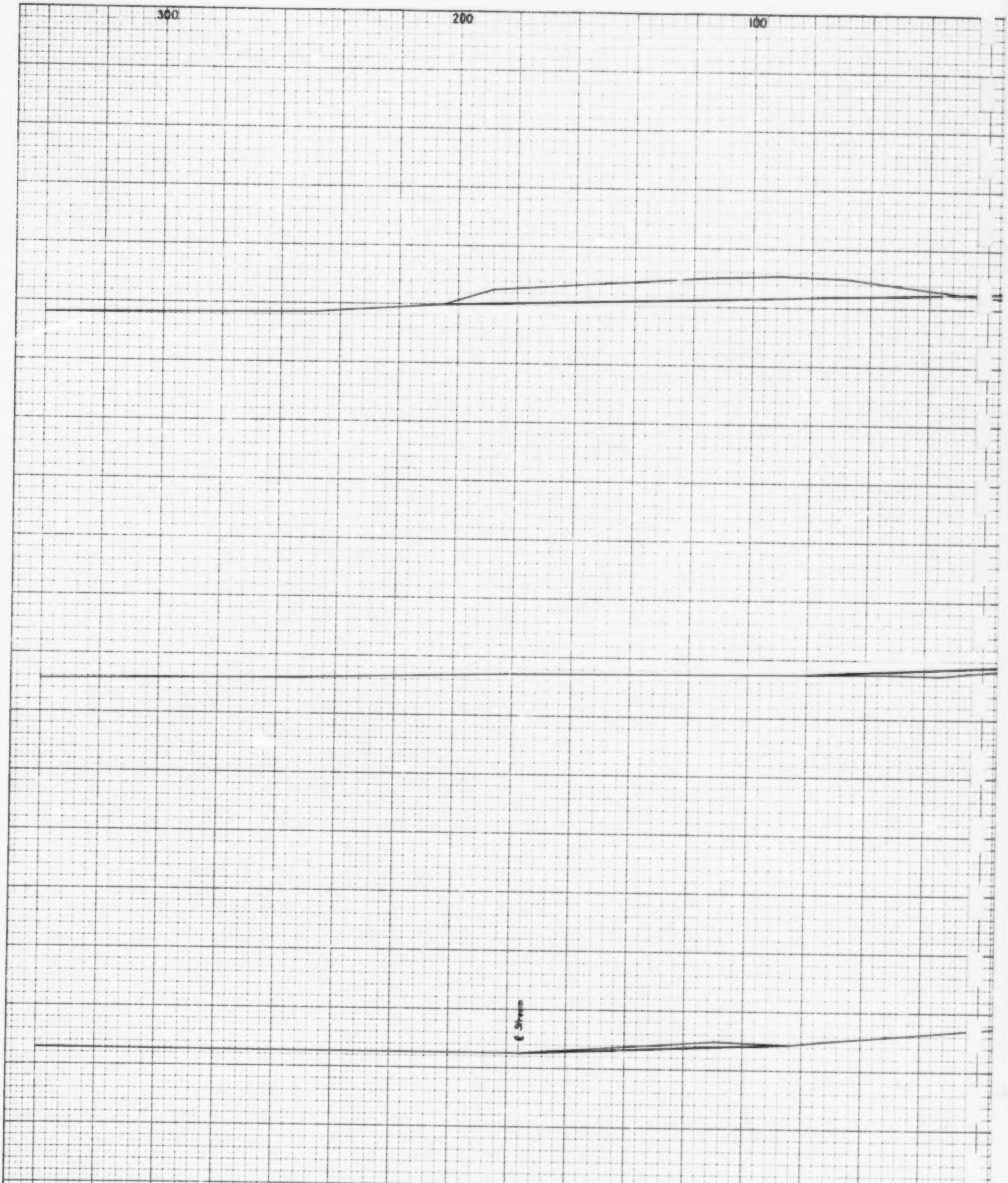

300
200
100
300
200
100

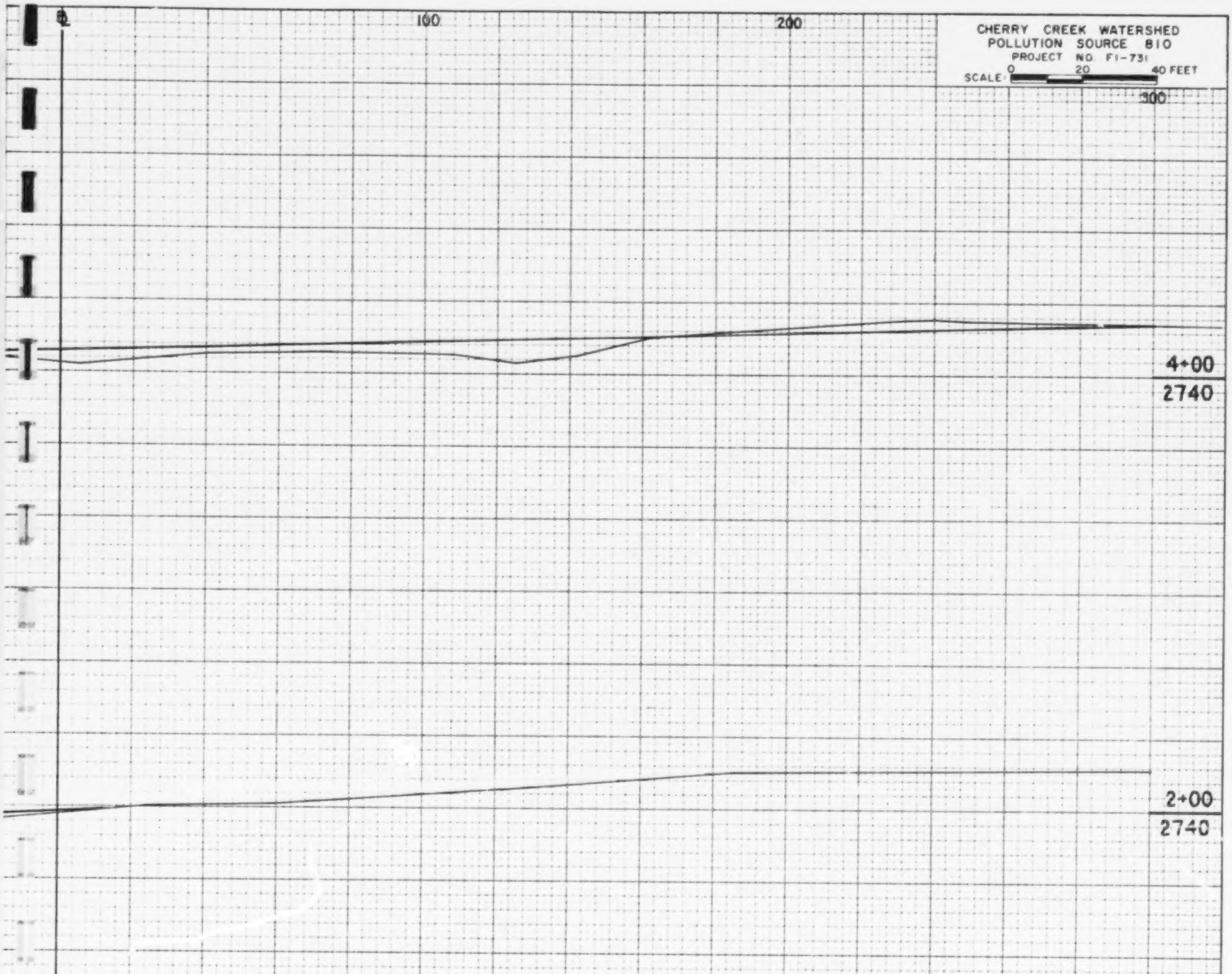


℄
100
200
℄ Stream
8+50
2700
℄ Stream
℄ Stream
7+00
2700
℄ Stream
5+70
2720
℄
100
200

CHERRY CREEK WATERSHED
POLLUTION SOURCE 218
PROJECT NO. FI-731
SCALE 0 20 40 FEET

SHEET NO.
12 OF 39

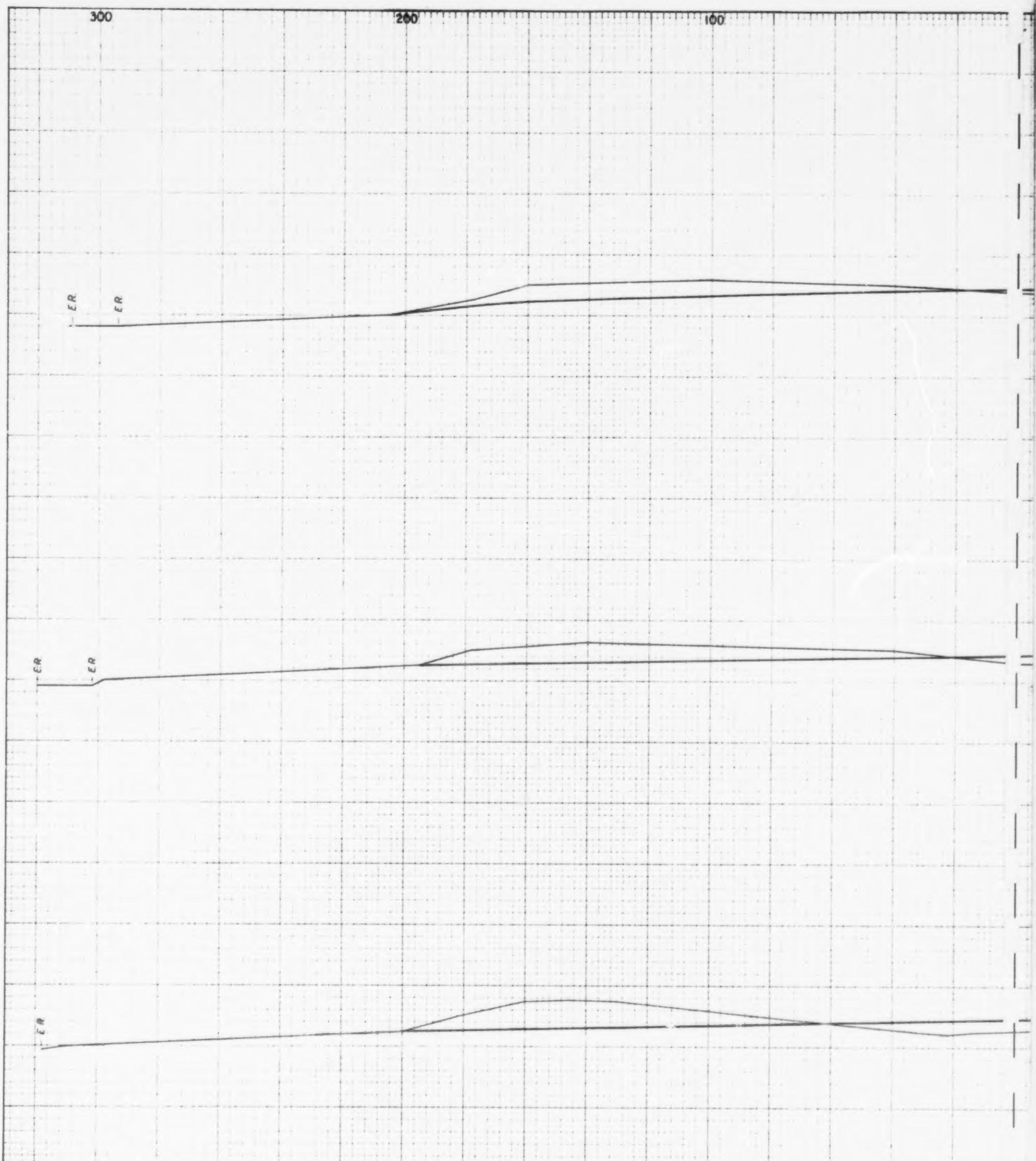

300
200
100
℄ Stream
300
200
100



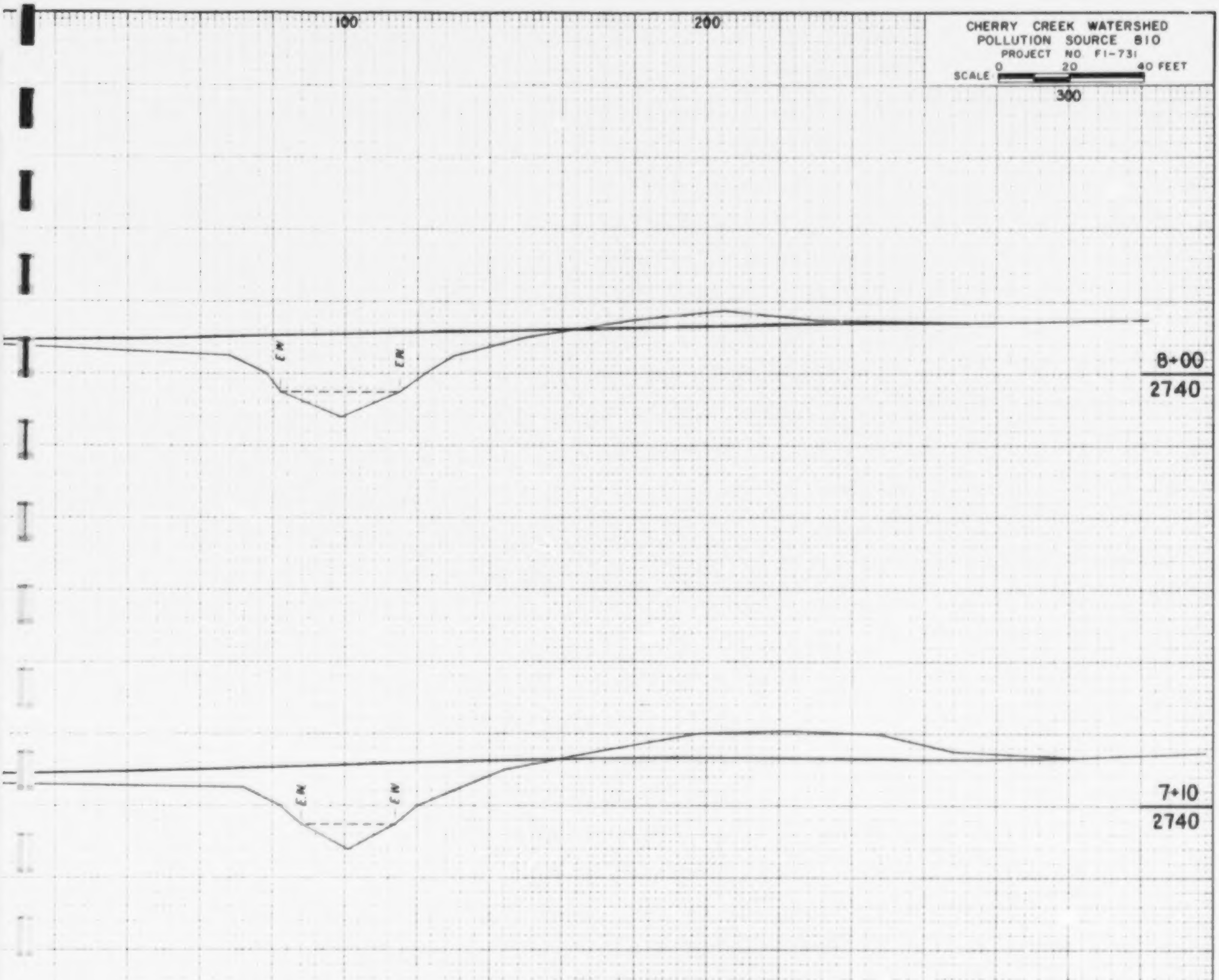
100
200
300
4+00
2740
2+00
2740
0+00
2740
100
200
300

CHERRY CREEK WATERSHED
POLLUTION SOURCE 810
PROJECT NO. F1-731
SCALE: 0 20 40 FEET

SHEET NO.
13 OF 39

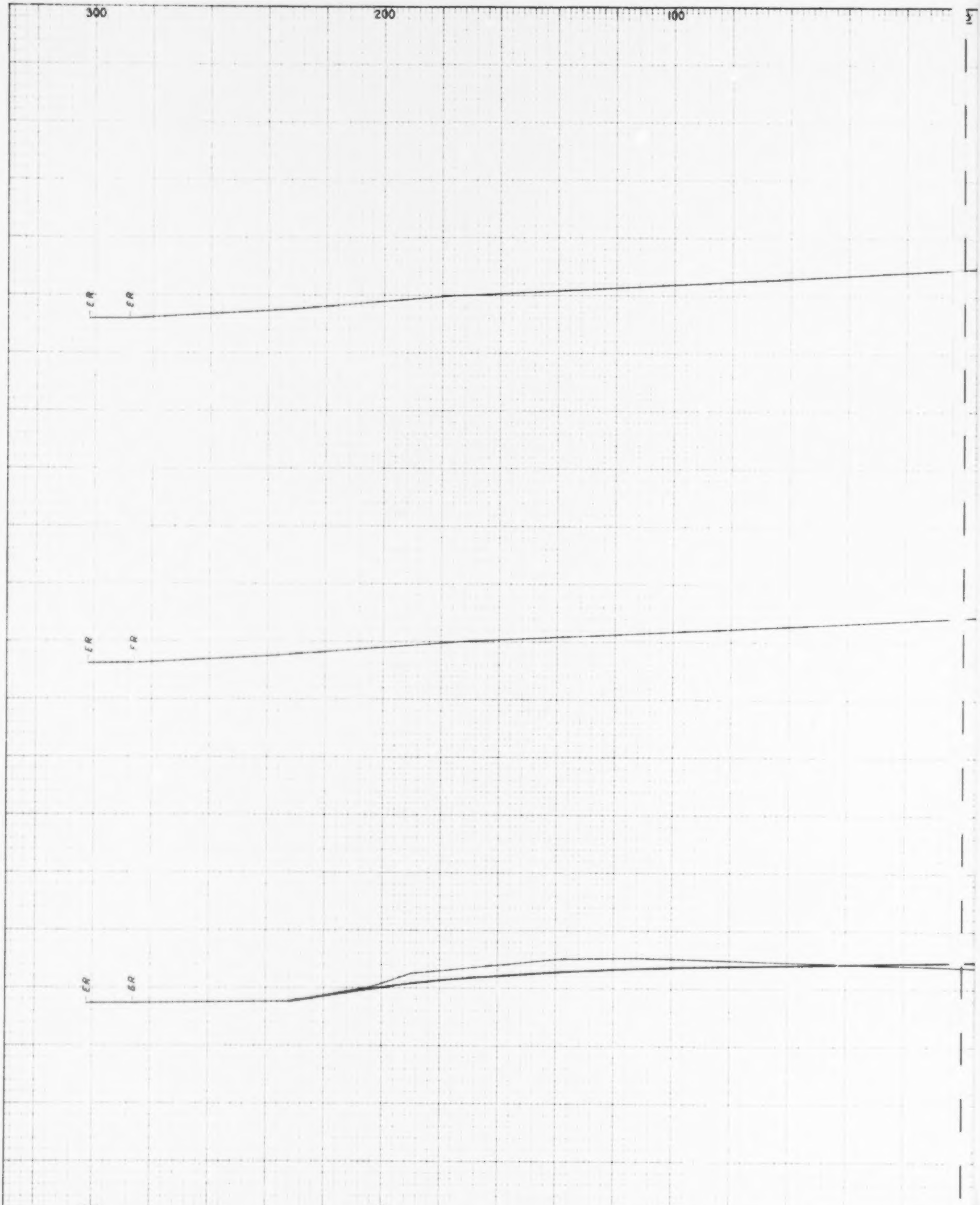

300
200
100
E.R.
E.R.
E.R.
E.R.
E.R.
300
200
100

CHERRY CREEK WATERSHED
POLLUTION SOURCE 810
PROJECT NO. F1-731
SCALE 0 20 40 FEET

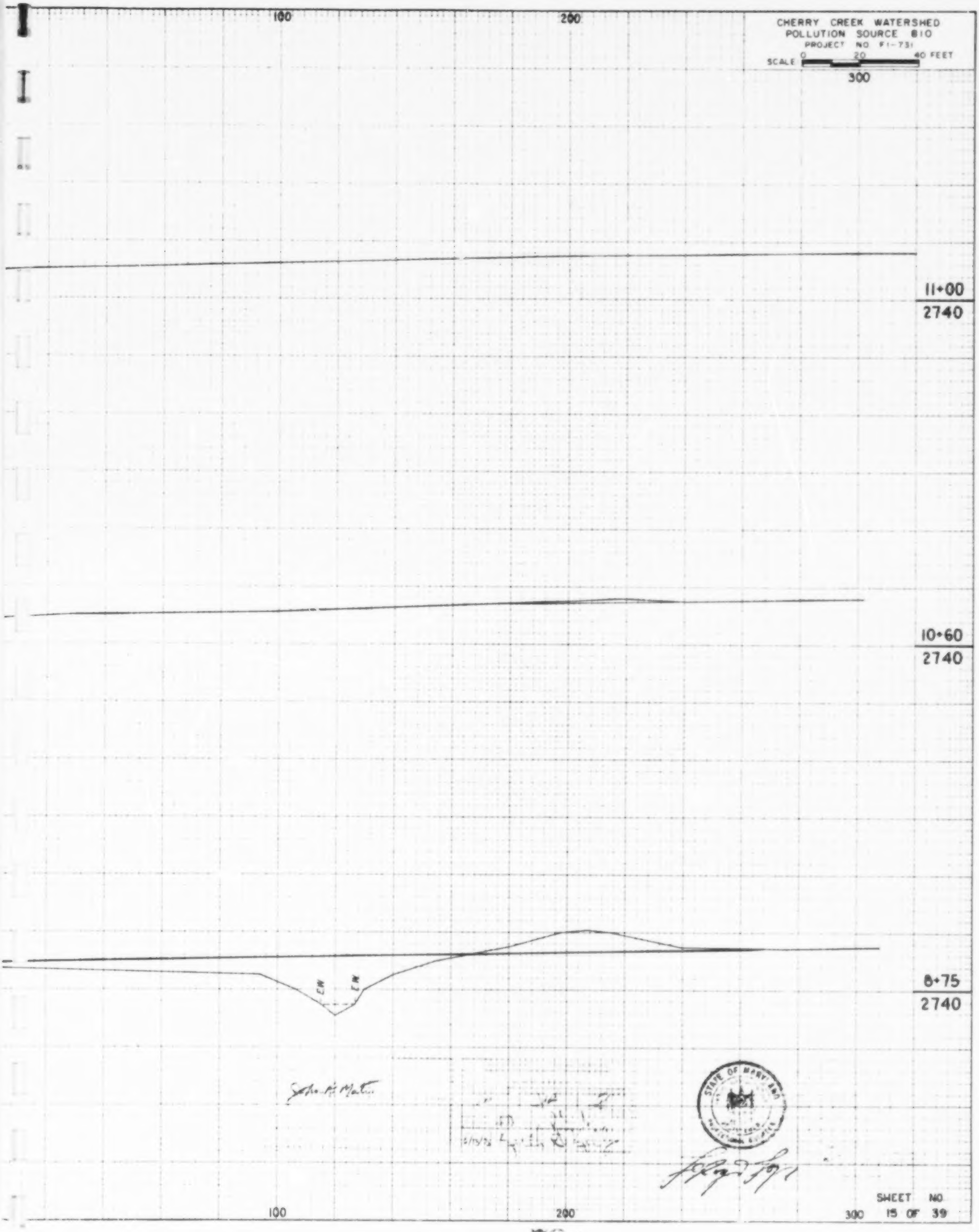

100
200
300
EW
EW
8+00
2740
EW
EW
7+10
2740
EW
EW
6+00
2740
100
200
300

STATE OF MARYLAND REGISTERED PROFESSIONAL ENGINEER

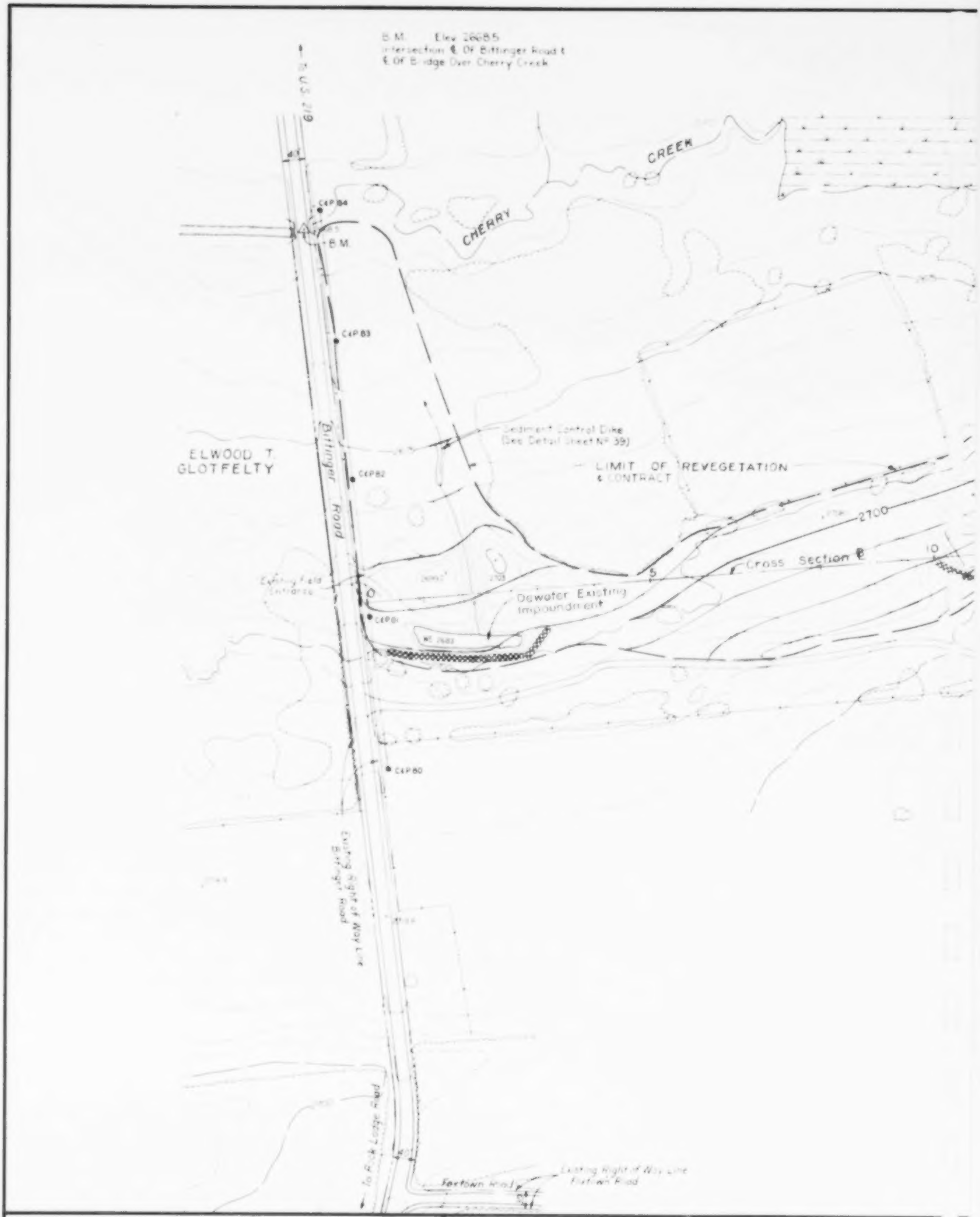
SHEET NO
14 OF 39


300
200
100
2
ER
ER
ER
ER
ER
ER
300
200
100

CHERRY CREEK WATERSHED
POLLUTION SOURCE 810
PROJECT NO F1-731


SCALE 0 20 40 FEET
100
200
300
11+00
2740
10+60
2740
8+75
2740
EW
EW
100
200
300

SHEET NO.
15 OF 39

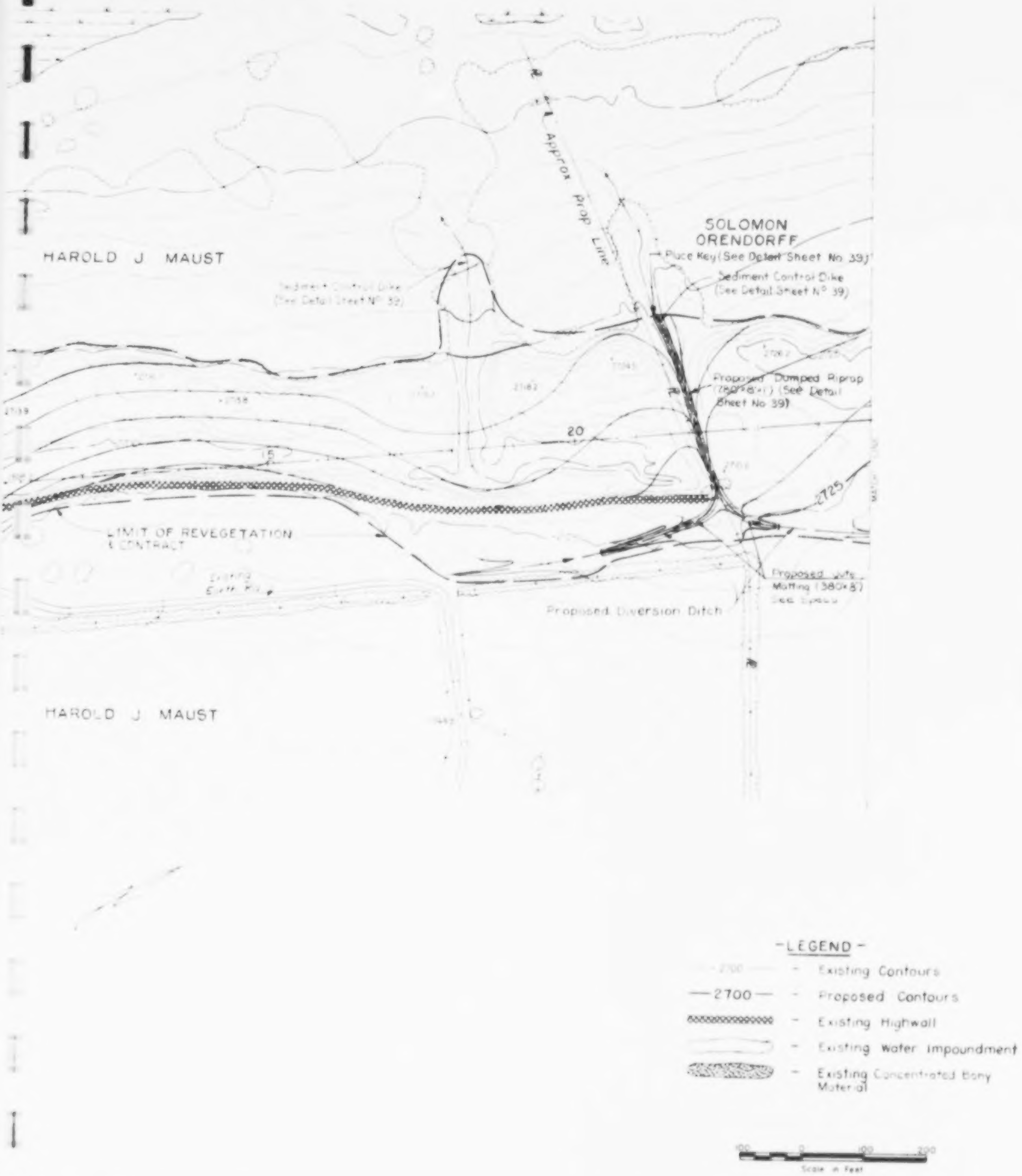


B.M. Elev. 2668.5
Intersection ℄ Of Bittinger Road &
℄ Of Bridge Over Cherry Creek
U.S. 219
CHERRY
CREEK
C&P 84
B.M.
C&P 83
Sediment Control Dike
(See Detail Sheet Nº 39)
ELWOOD T.
GLOTFELTY
Bittinger Road
C&P 82
LIMIT OF REVEGETATION
& CONTRACT
2700
Cross Section B
5
10
Existing Field
Entrance
0
Dewater Existing
Impoundment
C&P 81
WE 2683
C&P 80
Existing Right of Way Line
Bittinger Road
To Rich Lodge Road
Foxtown Road
Existing Right of Way Line
Foxtown Road

Prepared by

ZOLLMAN ASSOCIATES, INC.
CONSULTING ENGINEERS
BALTIMORE, MARYLAND

SKELLY & LOY
ENGINEERS - CONSULTANTS
HARRISBURG, PENNSYLVANIA


HAROLD J. MAUST
Approx Prop Line
SOLOMON ORENDORFF
Place Key (See Detail Sheet No 39)
Sediment Control Dike (See Detail Sheet Nº 39)
Sediment Control Dike (See Detail Sheet Nº 39)
Proposed Dumped Riprap (780'×8'×1') (See Detail Sheet No 39)
20
15
2725
LIMIT OF REVEGETATION & CONTRACT
Existing Earth Rd
Proposed Jute Matting (380×8') See Specs
Proposed Diversion Ditch
HAROLD J. MAUST
-LEGEND-
2700 - Existing Contours
2700 - Proposed Contours
- Existing Highwall
- Existing Water Impoundment
- Existing Concentrated Bony Material
100 0 100 200
Scale in Feet

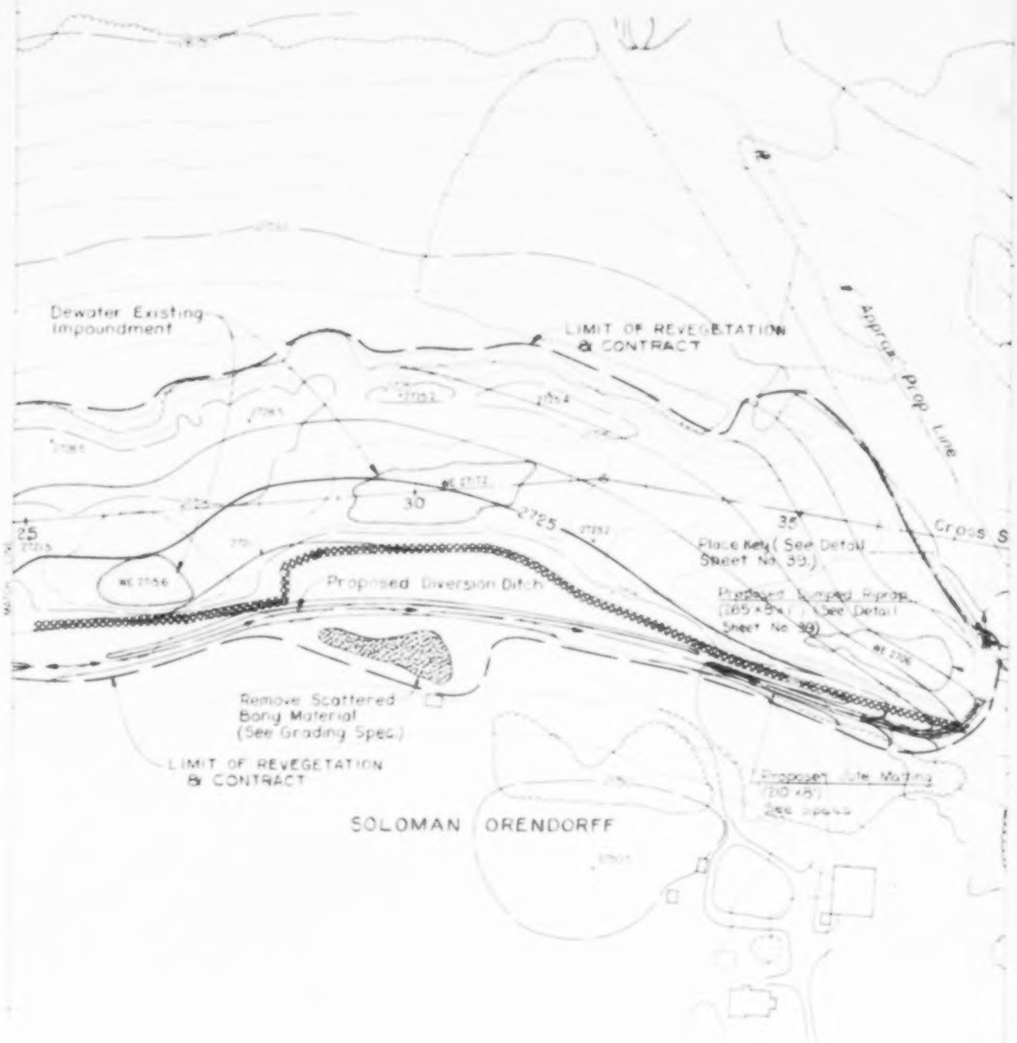
Keith E. Kelly

NO.	DATE	REVISIONS

POLLUTION SOURCE NO. 805
PLAN

CHERRY CREEK WATERSHED
MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

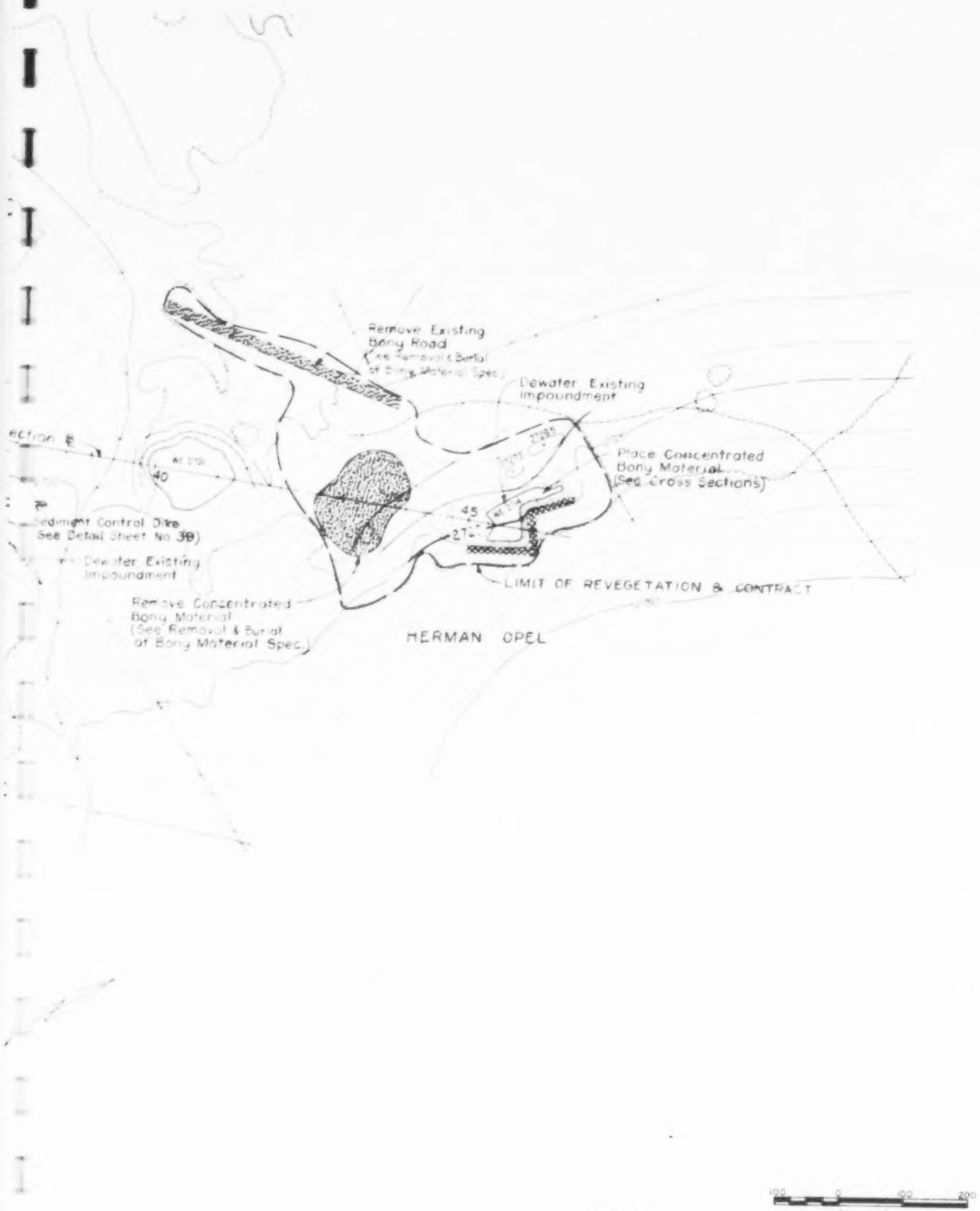
PROJECT NO. F1-731
FUNDS
DATE MAY 1973
DRAWING NO.
SHEET 16 of 39


Dewater Existing Impoundment
LIMIT OF REVEGETATION & CONTRACT
Approx. Prop. Line
2725
25
30
35
Cross S
Place Key (See Detail Sheet No. 39.)
Proposed Diversion Ditch
Proposed Dumped Riprap (185 x 5) (See Detail Sheet No. 39)
Remove Scattered Bony Material (See Grading Spec.)
LIMIT OF REVEGETATION & CONTRACT
Proposed Jute Matting (210 x 8) See Specs
SOLOMAN ORENDORFF

Prepared by

ZOLLMAN ASSOCIATES, INC.
CONSULTING ENGINEERS
BALTIMORE, MARYLAND

SKELLY & LOY
ENGINEERS – CONSULTANTS
HARRISBURG, PENNSYLVANIA

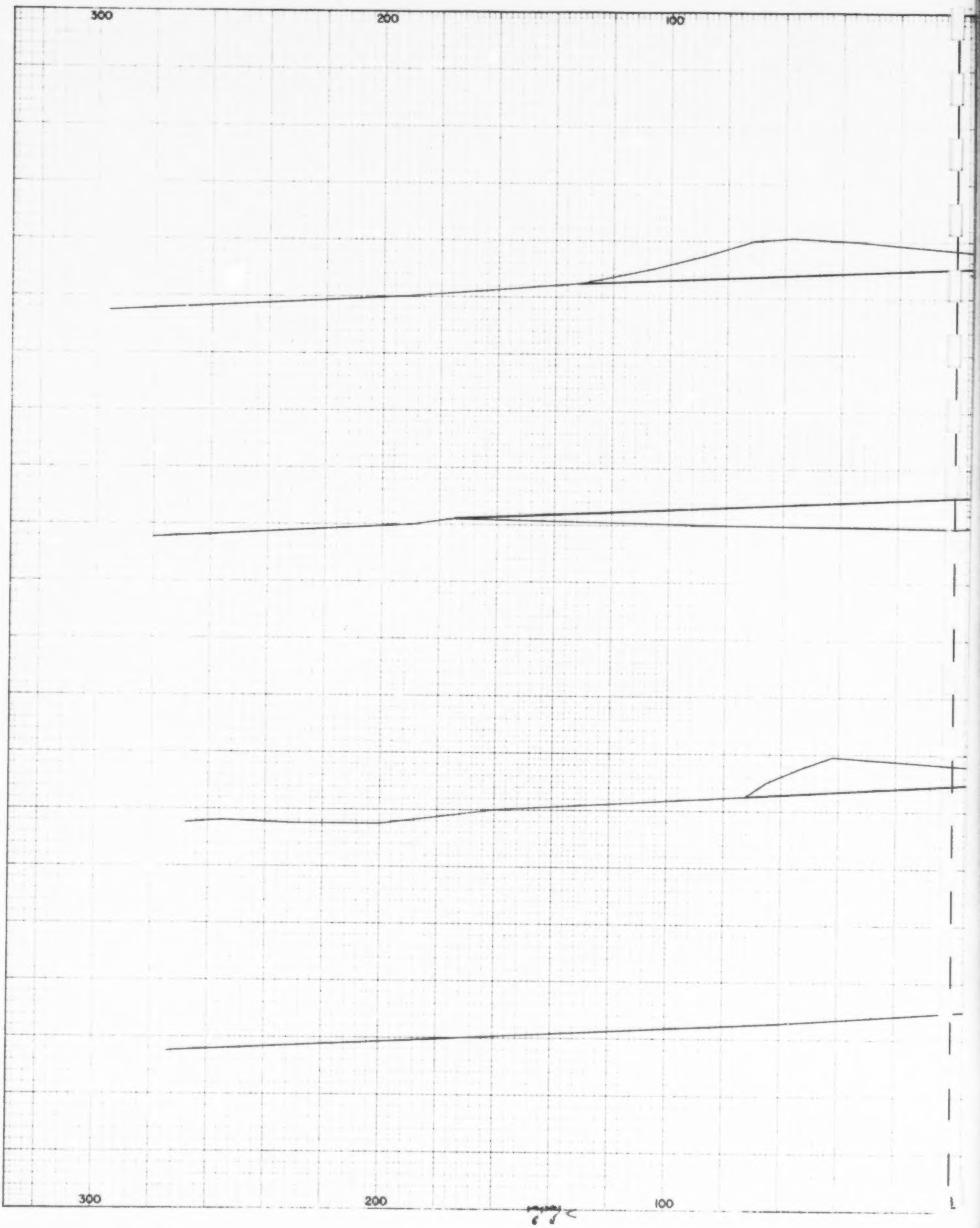

Remove Existing
Bony Road
(See Removal & Burial
of Bony Material Spec.)
Dewater Existing
Impoundment
Section B
40
Place Concentrated
Bony Material
(See Cross Sections)
45
Sediment Control Dike
See Detail Sheet No 39)
Dewater Existing
Impoundment
LIMIT OF REVEGETATION & CONTRACT
Remove Concentrated
Bony Material
(See Removal & Burial
of Bony Material Spec.)
HERMAN OPEL
100
0
100
200
Scale in Feet

NO.	DATE	REVISIONS

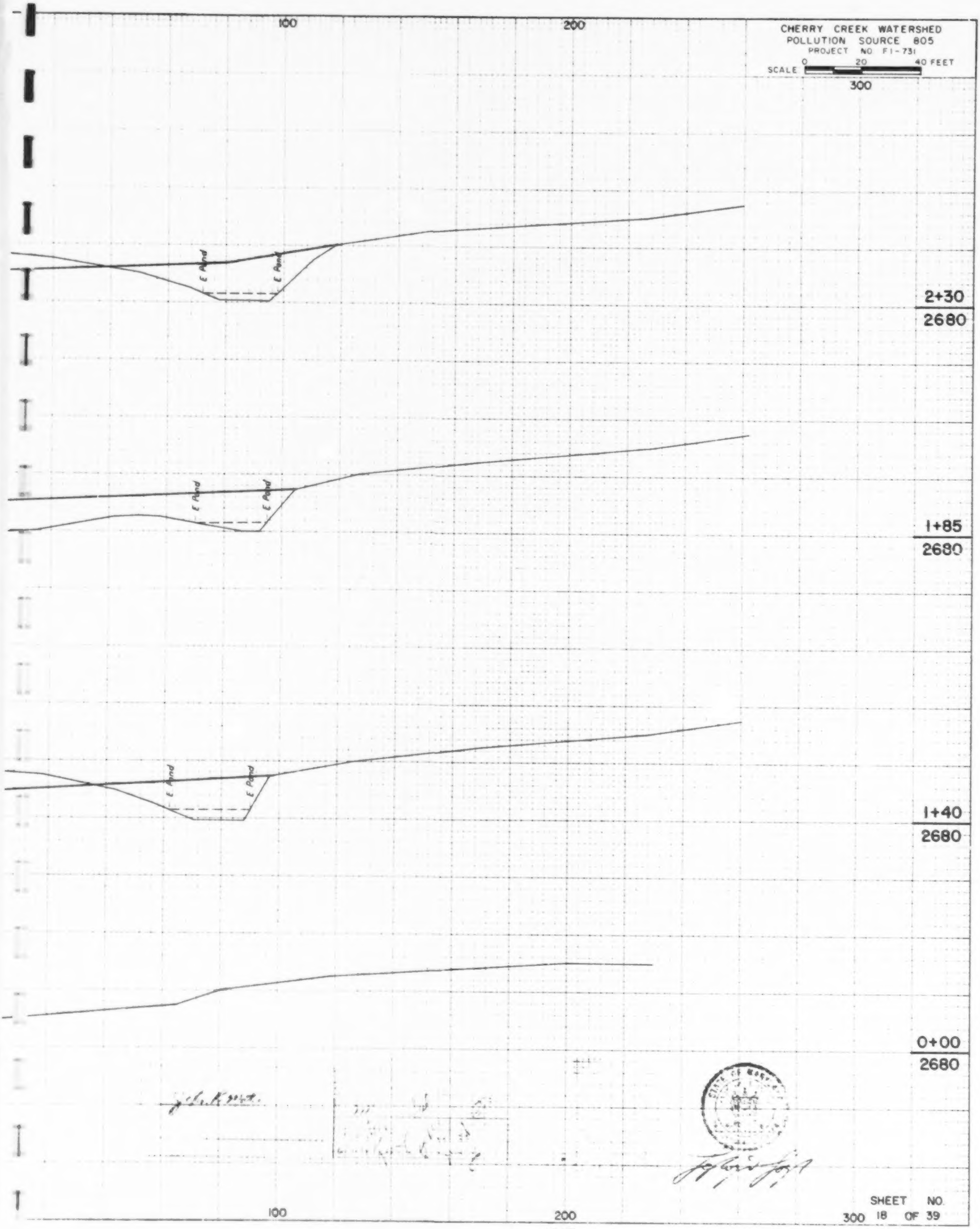
POLLUTION SOURCE NO. 805
PLAN

CHERRY CREEK WATERSHED
MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

PROJECT NO. F1-731
FUNDS
DATE MAY 1973
DRAWING NO.
SHEET 17 OF 39

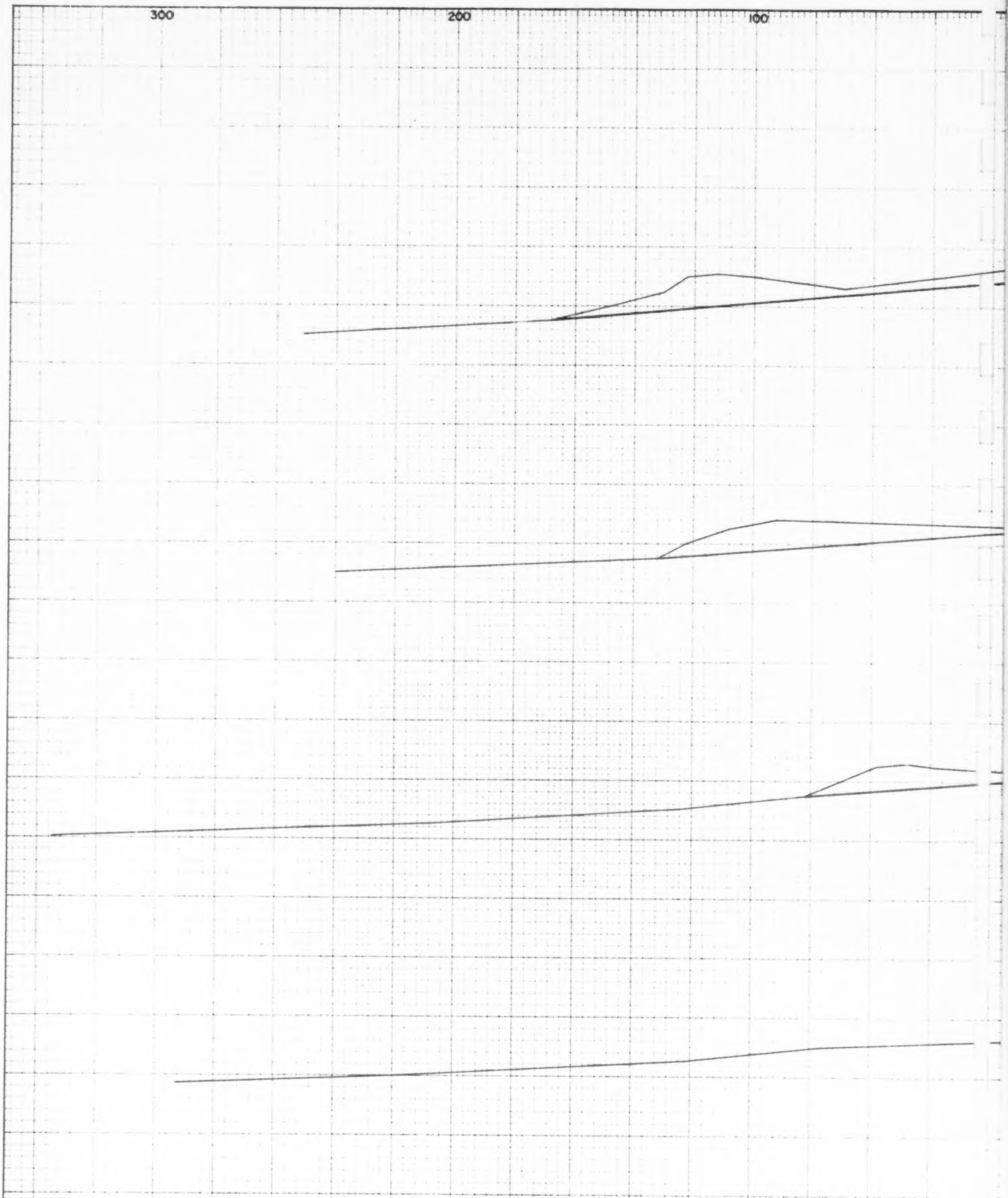

300
200
100
300
200
100

CHERRY CREEK WATERSHED
POLLUTION SOURCE 805
PROJECT NO F1-731



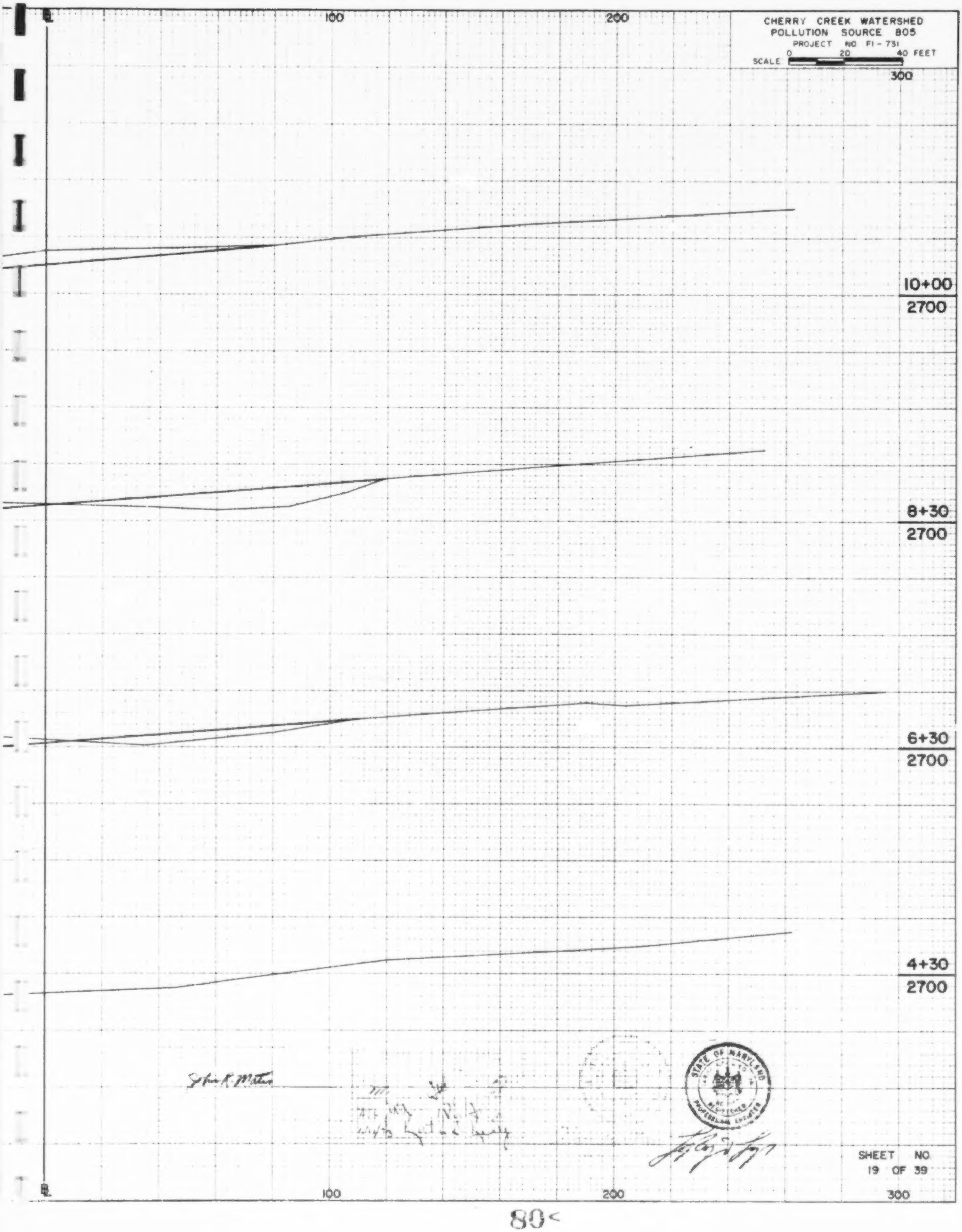
100
200
300
SCALE 0 20 40 FEET
E Pond
E Pond
2+30
2680
E Pond
E Pond
1+85
2680
E Pond
E Pond
1+40
2680
0+00
2680
100
200
300

SHEET NO.
18 OF 39

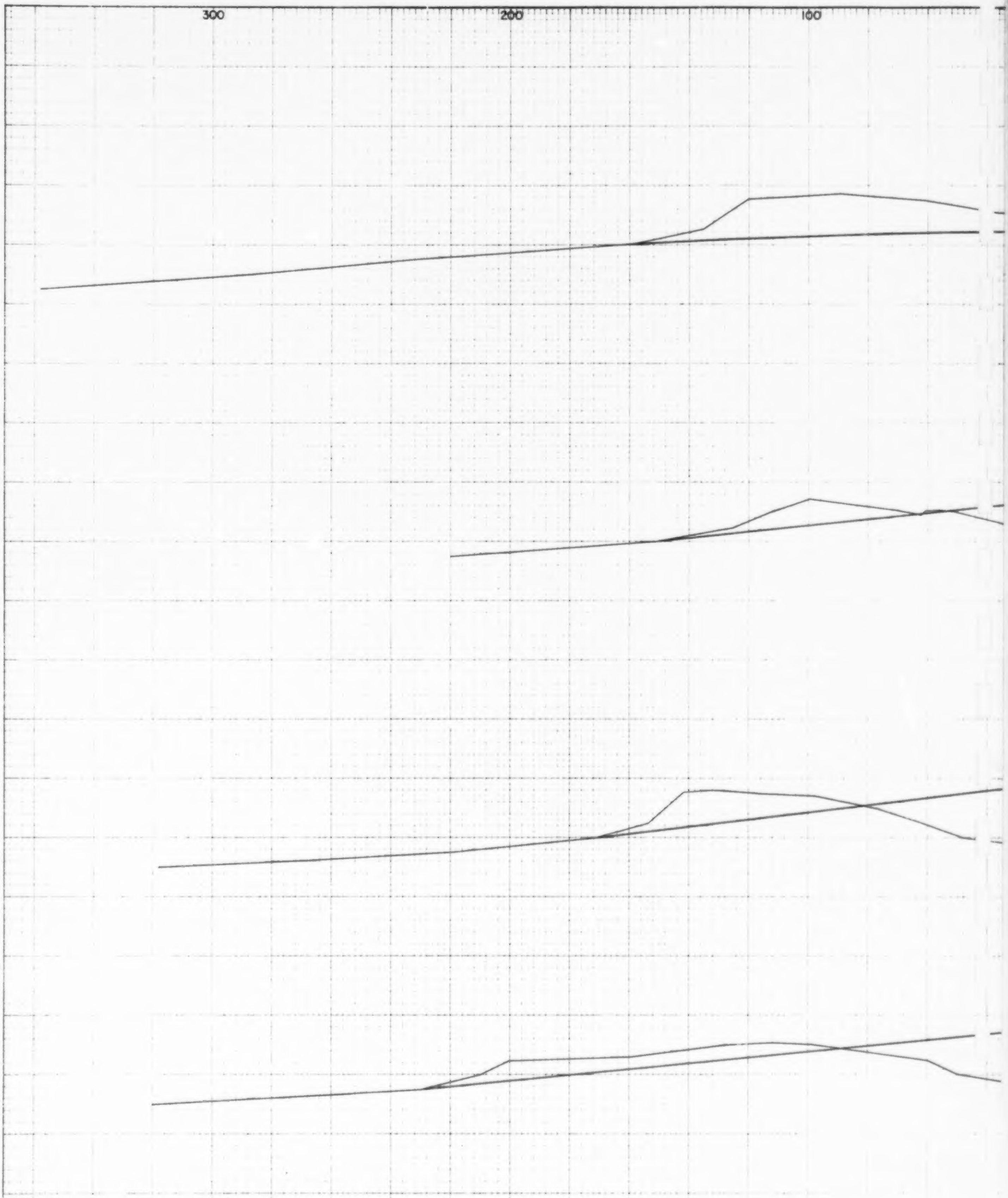


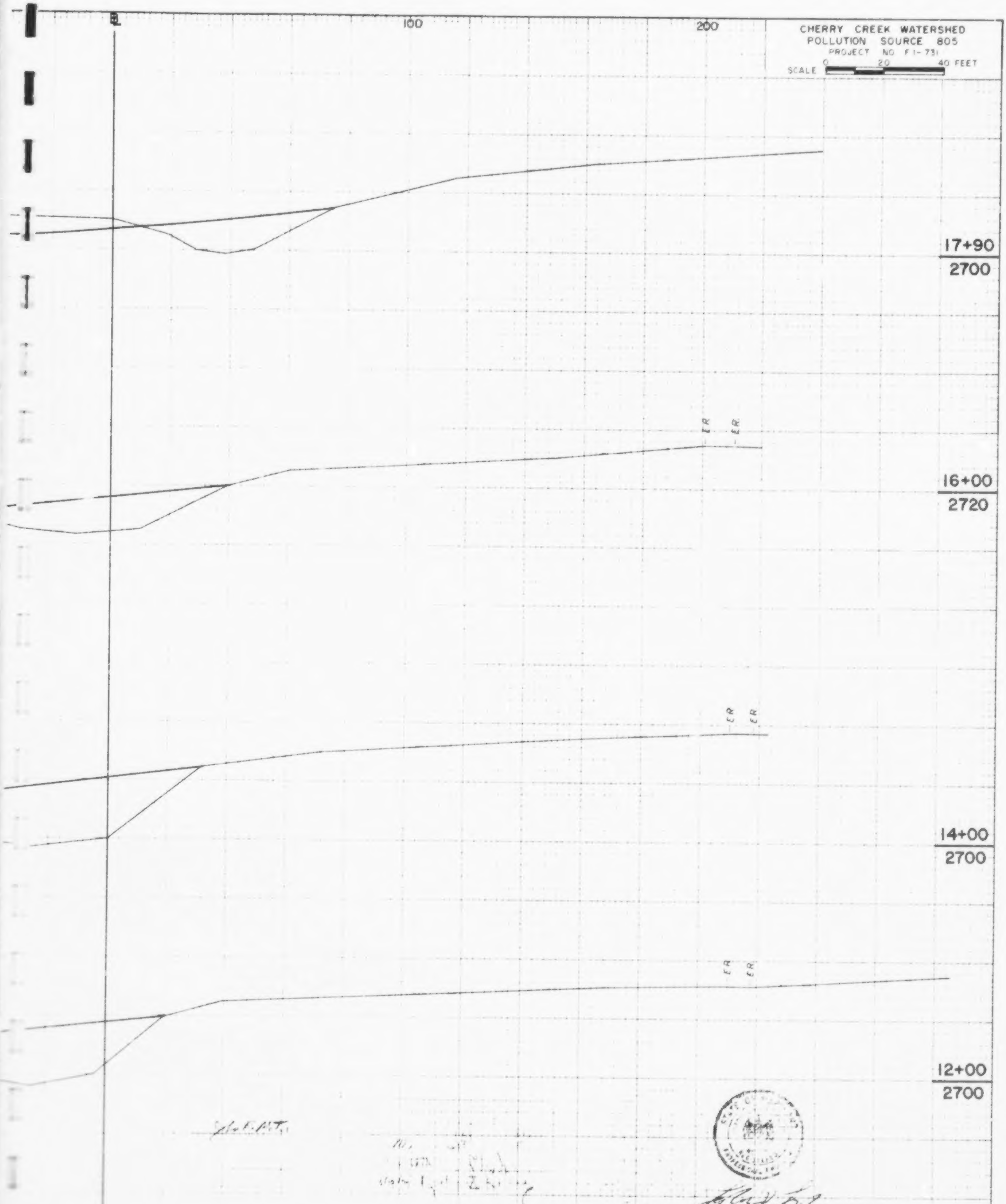
300
200
100
300
200
100

CHERRY CREEK WATERSHED
POLLUTION SOURCE 805
PROJECT NO FI-731


SCALE 0 20 40 FEET
℄
100
200
300
10+00
2700
8+30
2700
6+30
2700
4+30
2700
℄
100
200
300

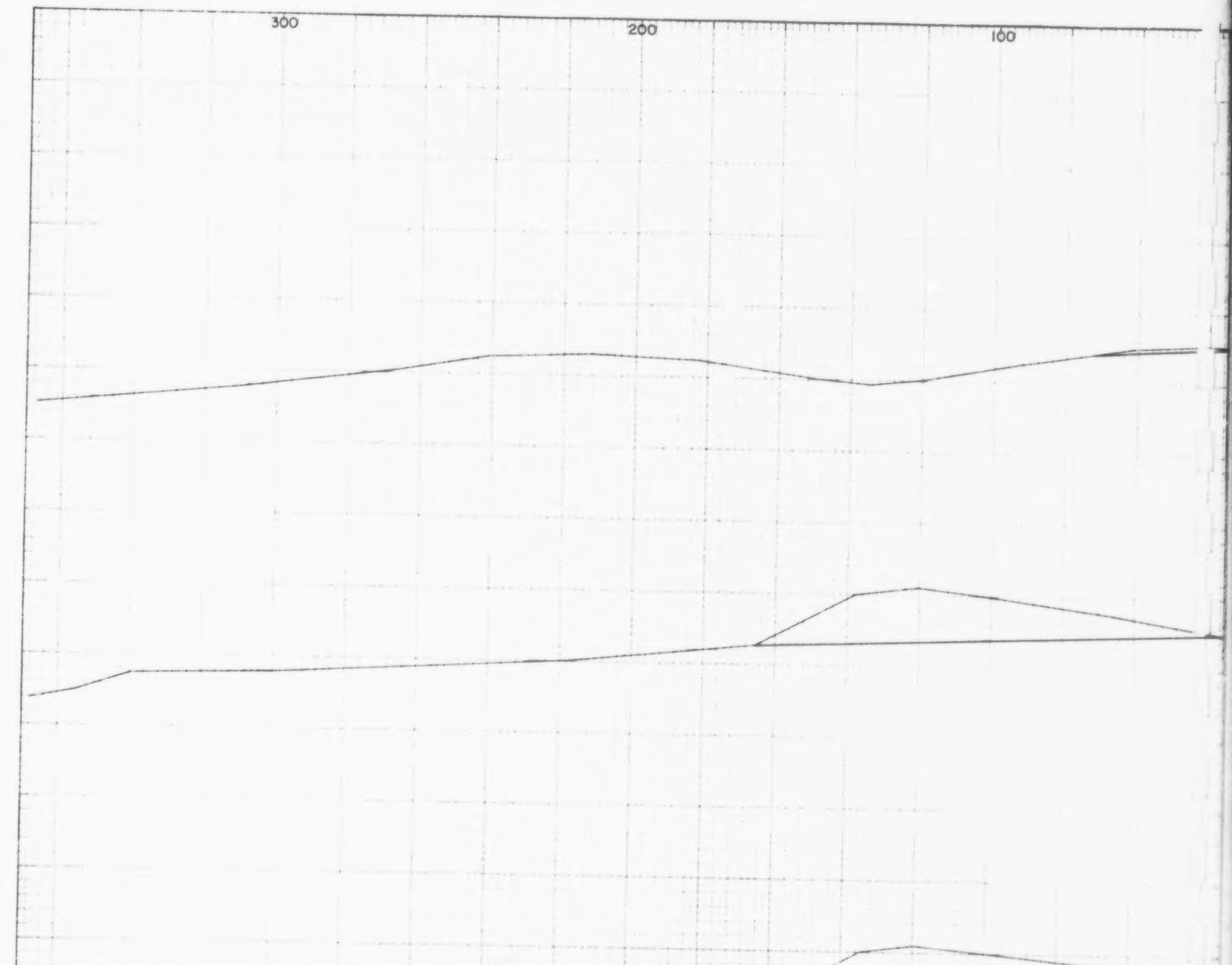
SHEET NO.
19 OF 39


300
200
100
300
200
100

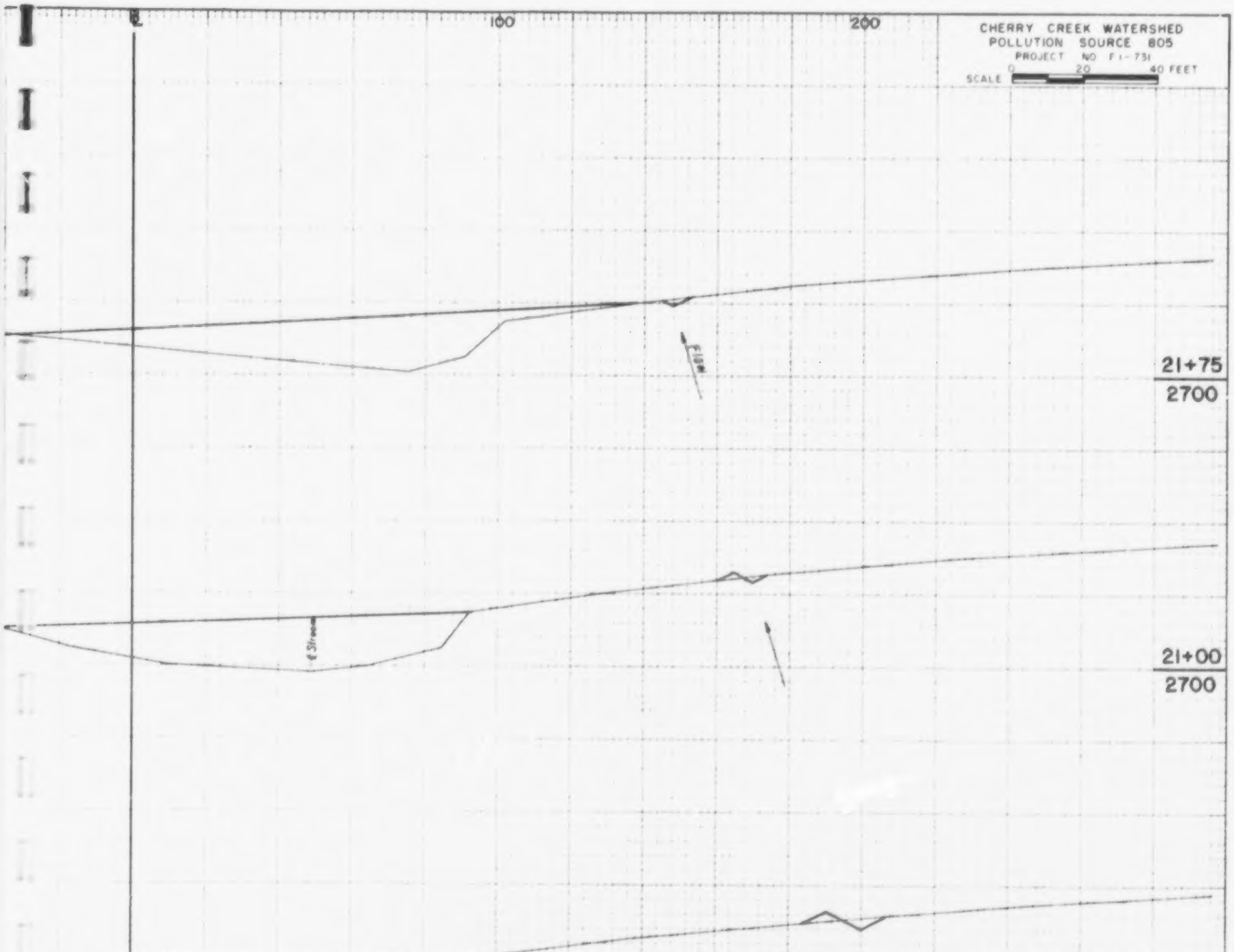

℄
100
200
17+90
2700
16+00
2720
14+00
2700
12+00
2700
ER
ER
ER
ER
ER
ER
℄
100
200

CHERRY CREEK WATERSHED
POLLUTION SOURCE 805
PROJECT NO F1-731
SCALE 0 20 40 FEET

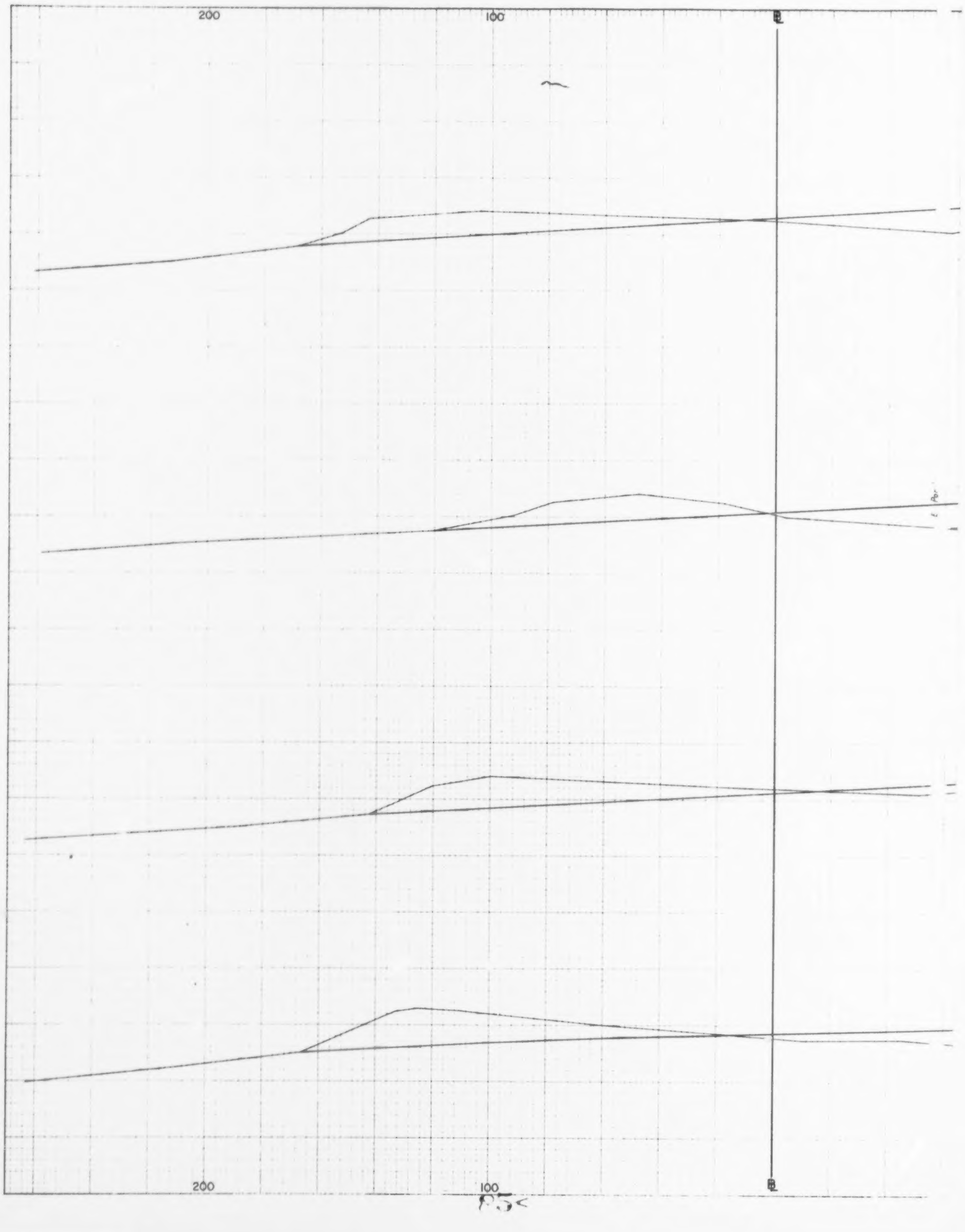
SHEET NO
20 OF 39


300
200
100
300
200
100

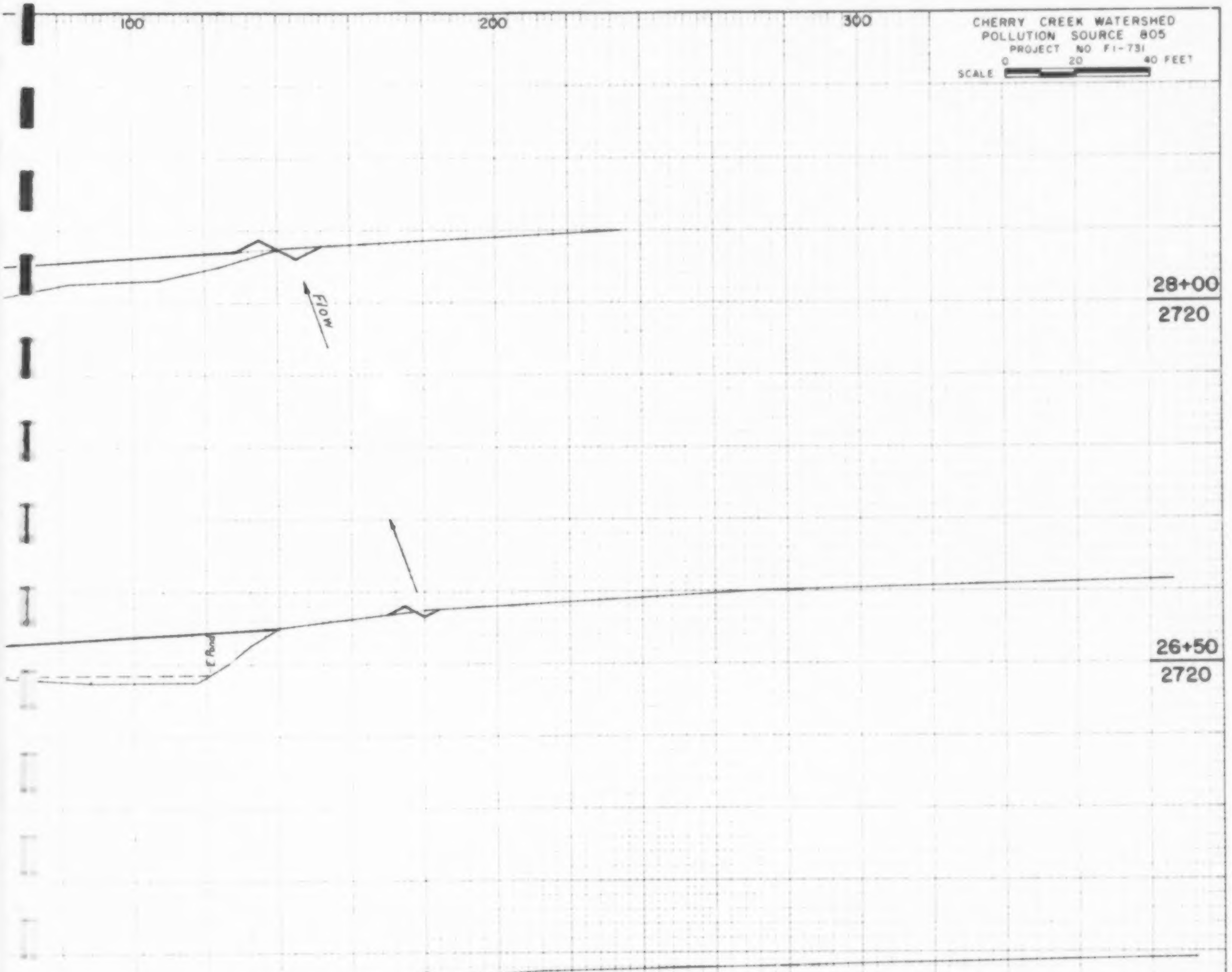
CHERRY CREEK WATERSHED
POLLUTION SOURCE 805
PROJECT NO F1-731


SCALE 0 20 40 FEET
℄
100
200
Flow
℄ Stream
21+75
2700
21+00
2700
18+90
2700
18+35
2700
Flow

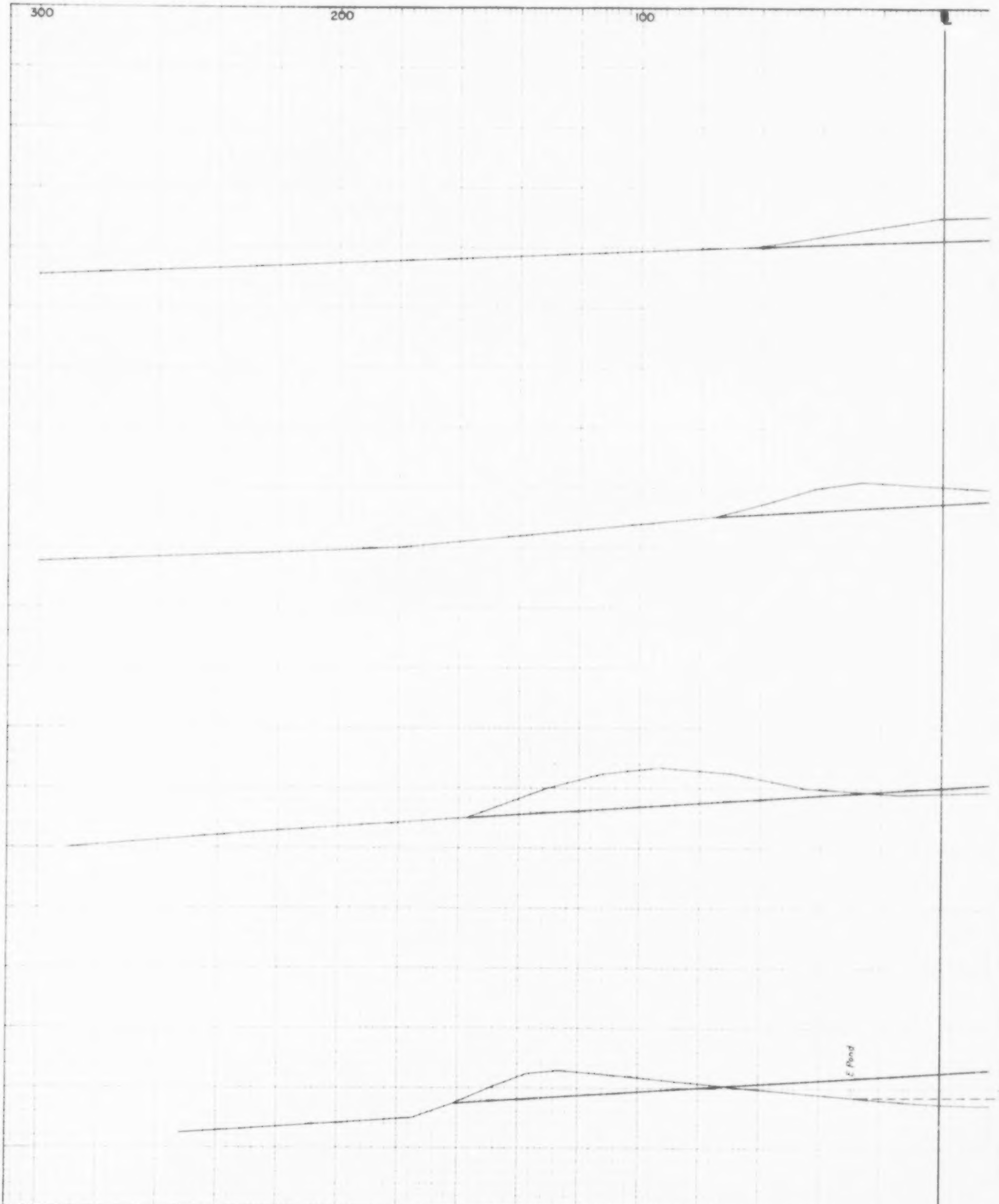
SHEET NO
21 OF 59


℄
℄

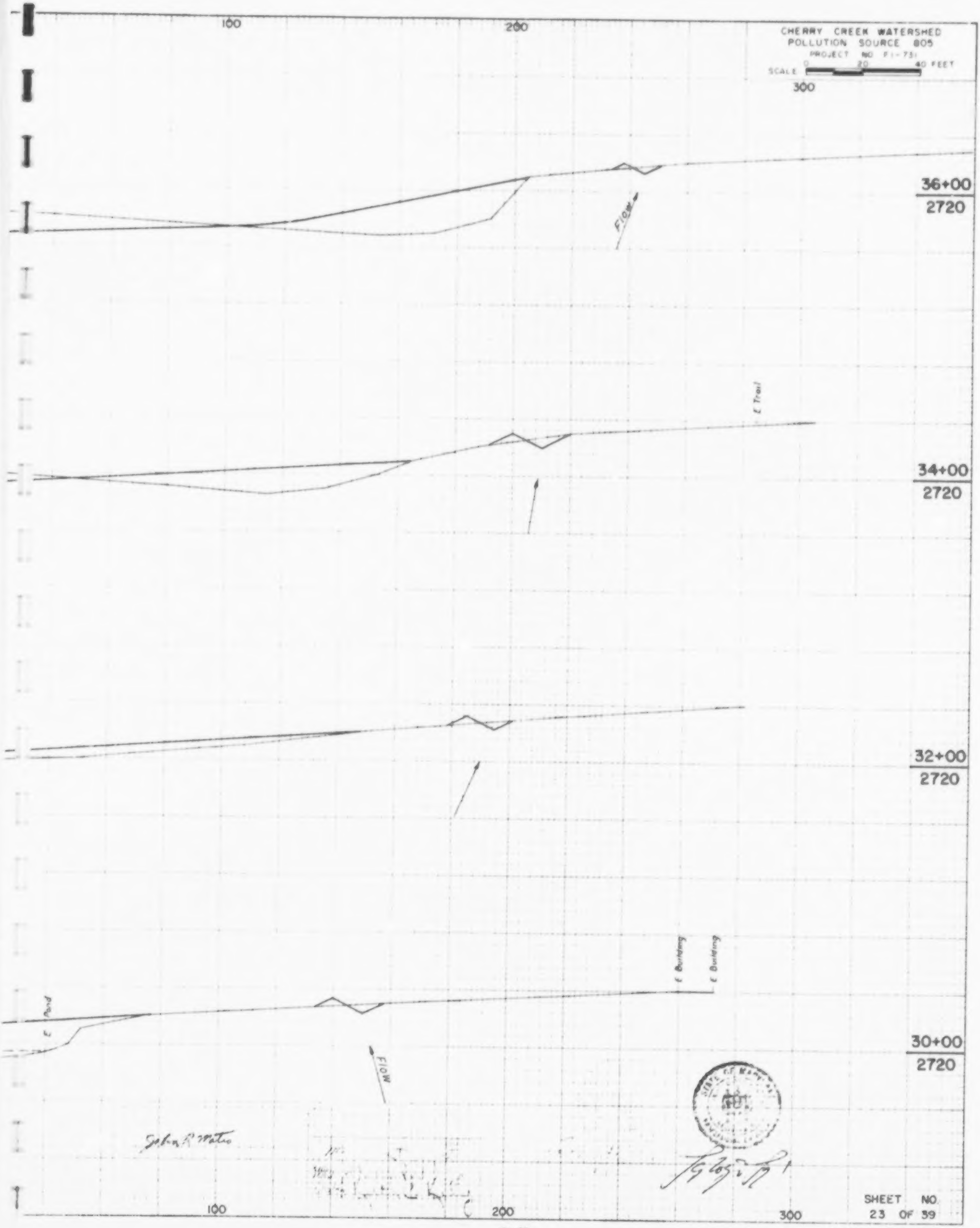
CHERRY CREEK WATERSHED
POLLUTION SOURCE 805
PROJECT NO FI-731


100
200
300
SCALE
0
20
40 FEET
FLOW
28+00
2720
E Pond
26+50
2720
25+00
2720
FLOW
23+00
2720
100
200
300

SHEET NO
22 OF 39

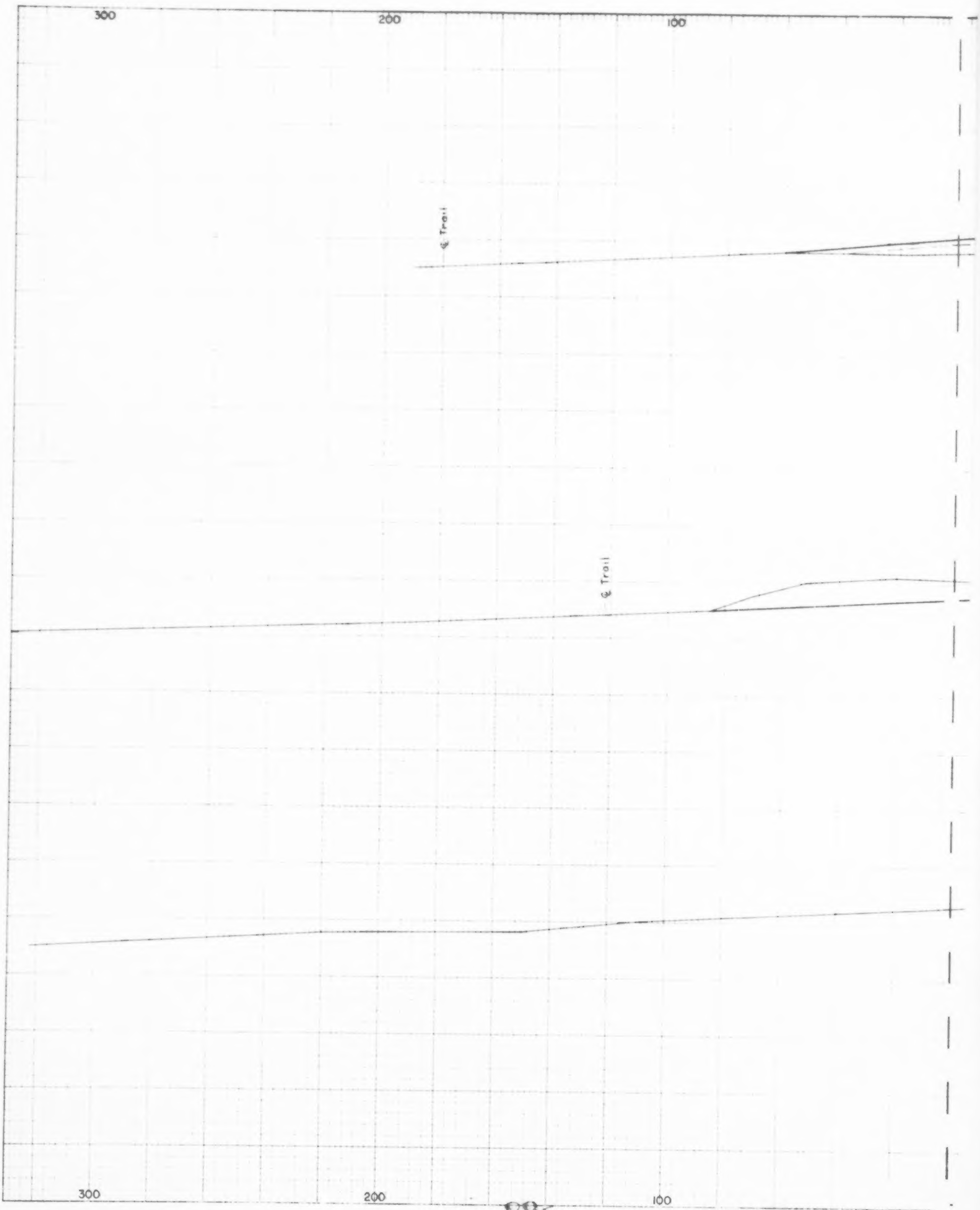

℄
℄ Pond
℄

CHERRY CREEK WATERSHED
POLLUTION SOURCE 805
PROJECT NO F1-731

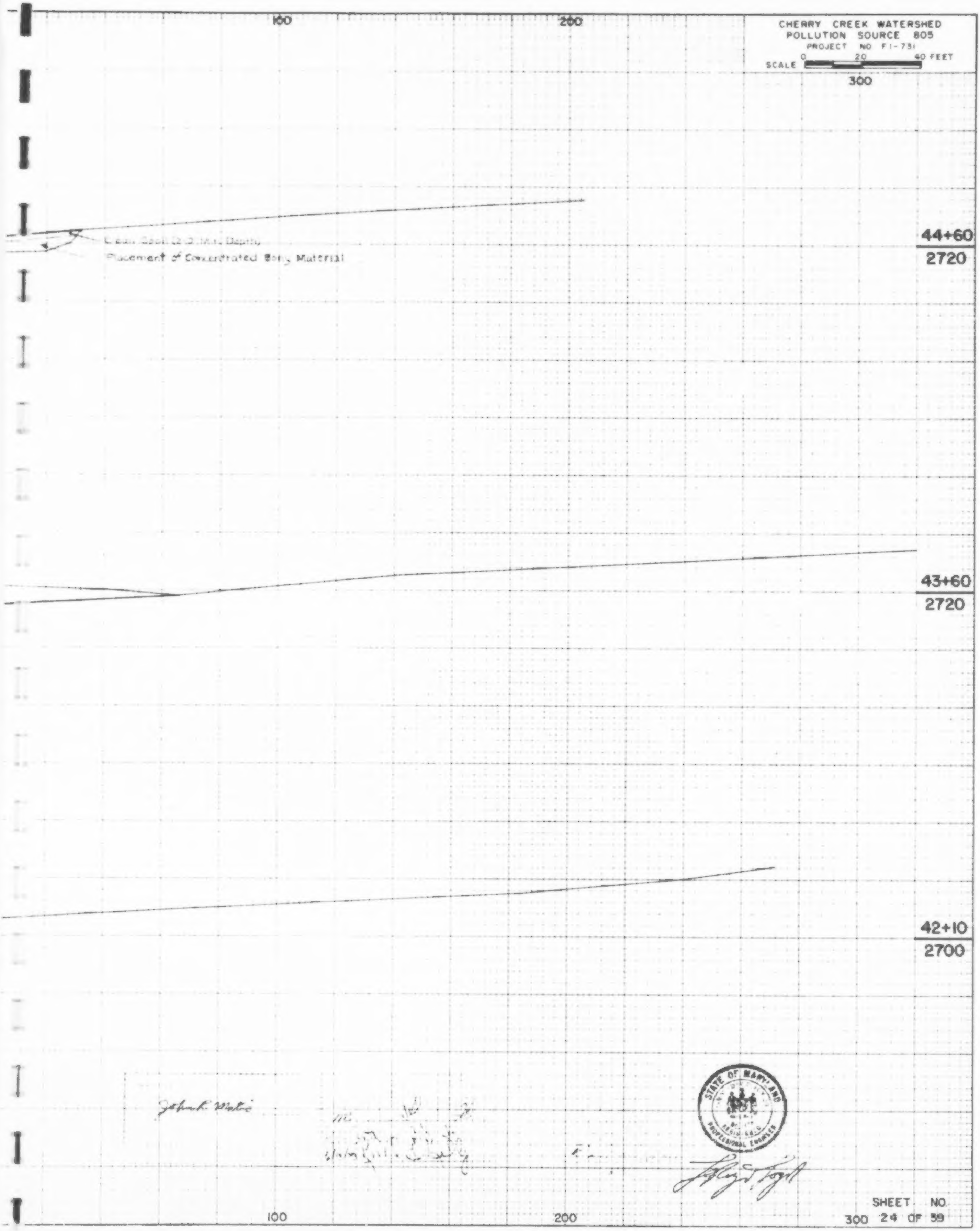

SCALE
0
20
40 FEET
100
200
300
36+00
2720
Flow
℄ Trail
34+00
2720
32+00
2720
℄ Building
℄ Building
℄ Pond
30+00
2720
FLOW
100
200
300

John R Watro

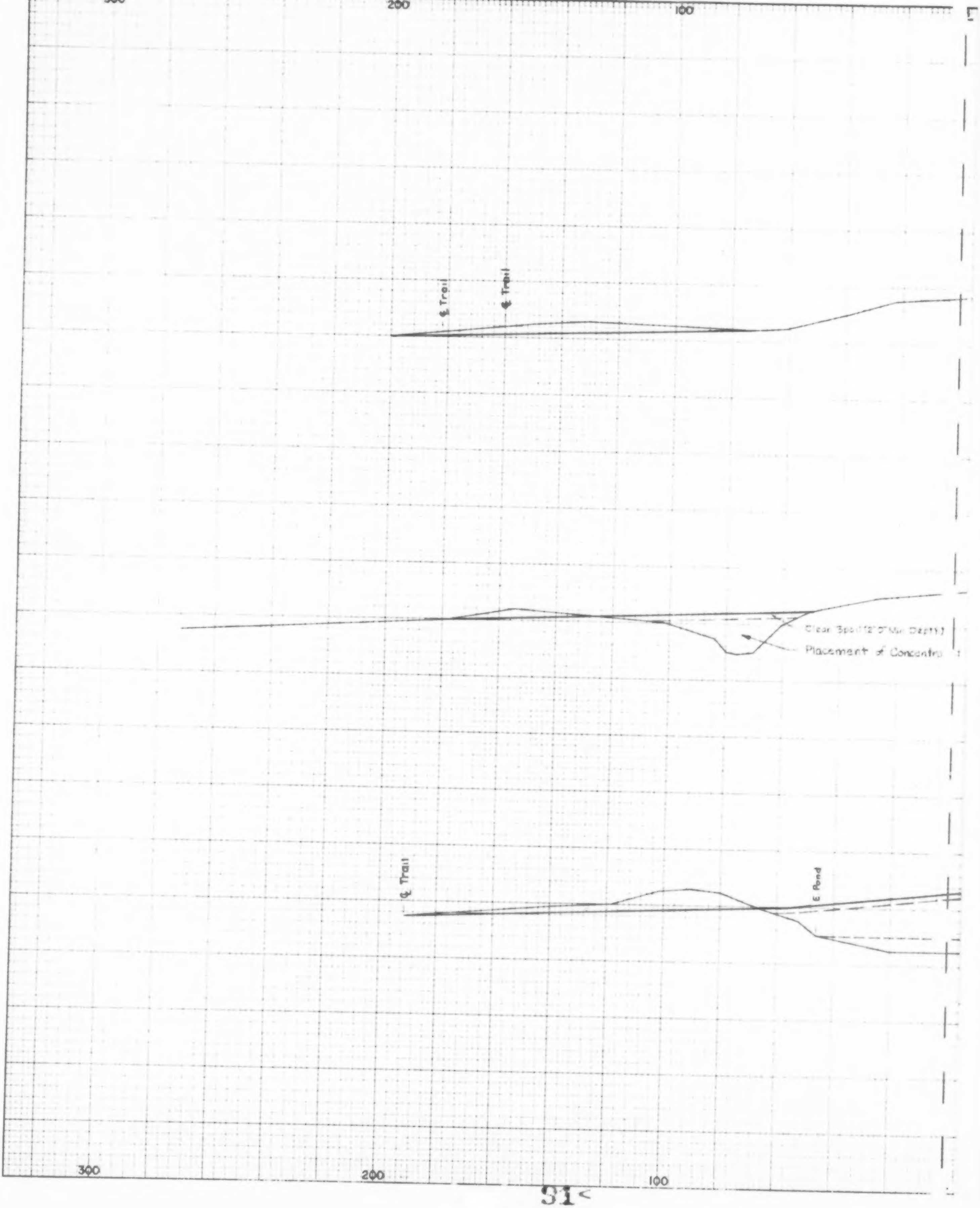
SHEET NO.
23 OF 39


300
200
100
℄ Trail
℄ Trail
300
200
100

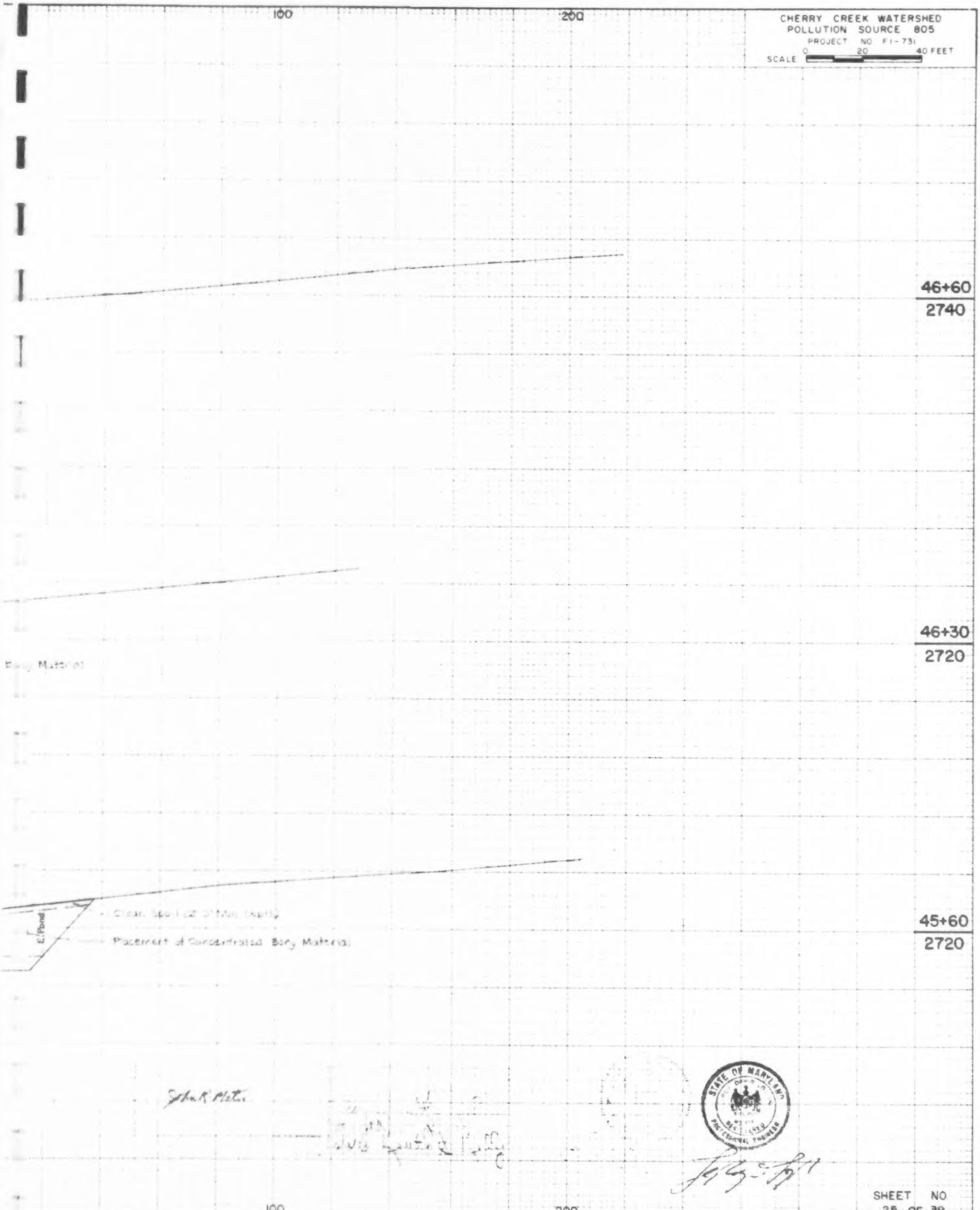
CHERRY CREEK WATERSHED
POLLUTION SOURCE 805
PROJECT NO F1-731
SCALE 0 20 40 FEET


100
200
300
Clean Soil (2'-3' Min. Depth)
Placement of Concentrated Bony Material
44+60
2720
43+60
2720
42+10
2700
100
200
300

SHEET NO.
24 OF 39

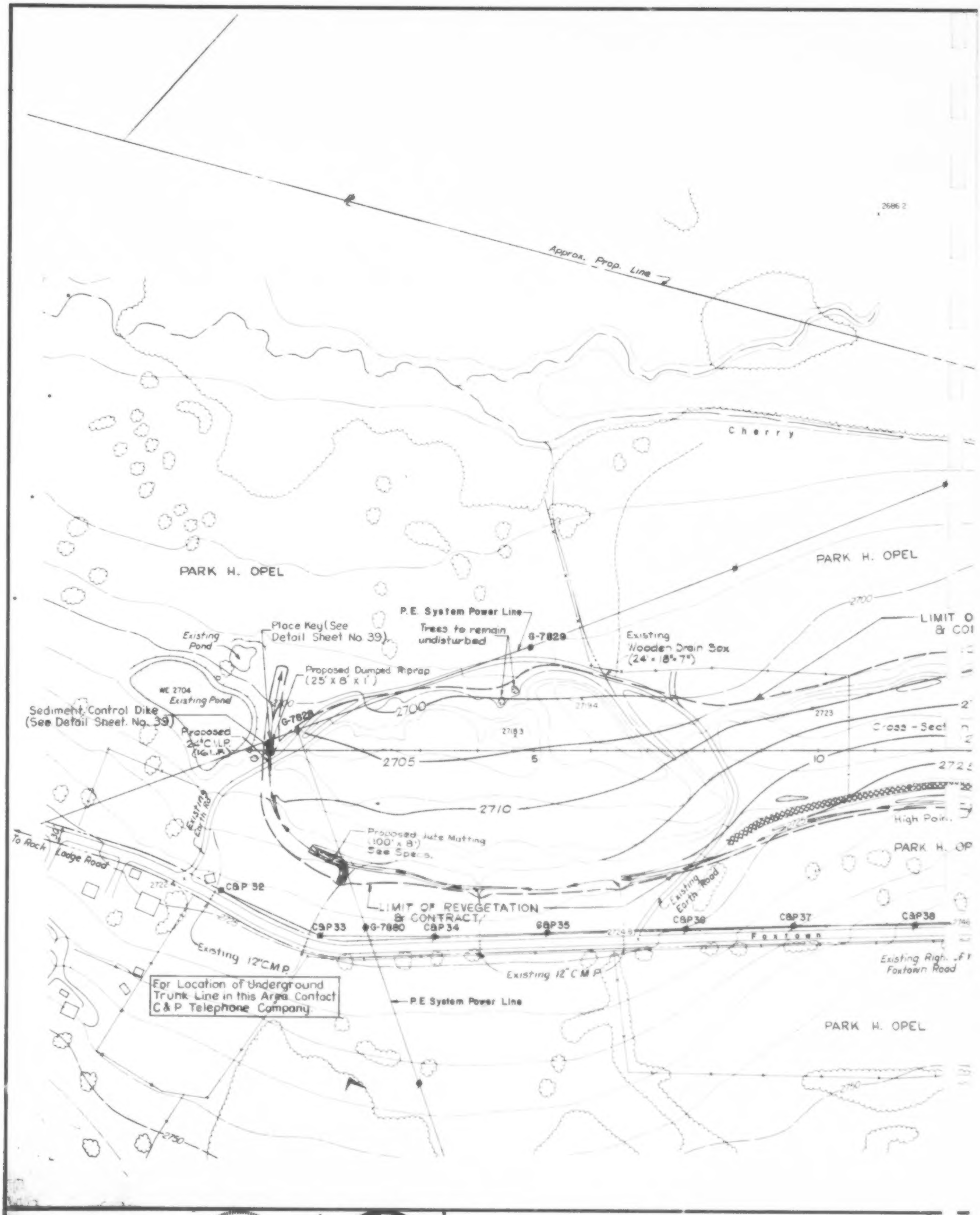

300
200
100
℄ Trail
℄ Trail
Clean Spoil (2'0" Min Depth)
Placement of Concentra
℄ Trail
℄ Pond
300
200
100

CHERRY CREEK WATERSHED
POLLUTION SOURCE 805
PROJECT NO. FI-731
SCALE 0 20 40 FEET



100
200
46+60
2740
46+30
2720
Bony Material
Clean Spoil (2' Min. Depth)
Placement of Concentrated Bony Material
E. Pond
45+60
2720
100
200

SHEET NO
25 OF 39


Approx. Prop. Line
2686.2
Cherry
PARK H. OPEL
PARK H. OPEL
PARK H. OP
PARK H. OPEL
P.E. System Power Line
Trees to remain undisturbed
G-7829
Existing Wooden Drain Box (24' × 18' × 7')
Place Key (See Detail Sheet No. 39)
Existing Pond
WE 2704
Existing Pond
Proposed Dumped Riprap (25' x 8' x 1')
Sediment Control Dike (See Detail Sheet No. 39)
Proposed 24" C.M.P. (16 L.F.)
G-7828
2700
2705
2710
2700
2725
2723
2718.3
2719.4
5
10
0
Cross-Sect
High Point
LIMIT O
& CO
Existing Earth Rd
To Rock Lodge Road
30'
2722
CBP 32
Proposed Jute Matting (100' x 8') See Specs.
LIMIT OF REVEGETATION & CONTRACT
Existing Earth Road
CBP 33
G-7880
CBP 34
CBP 35
CBP 36
CBP 37
CBP 38
Foxtown
2724.87
Existing 12" CMP
Existing 12" CMP
Existing Right of Foxtown Road
For Location of Underground Trunk Line in this Area Contact C&P Telephone Company
P.E. System Power Line
2750

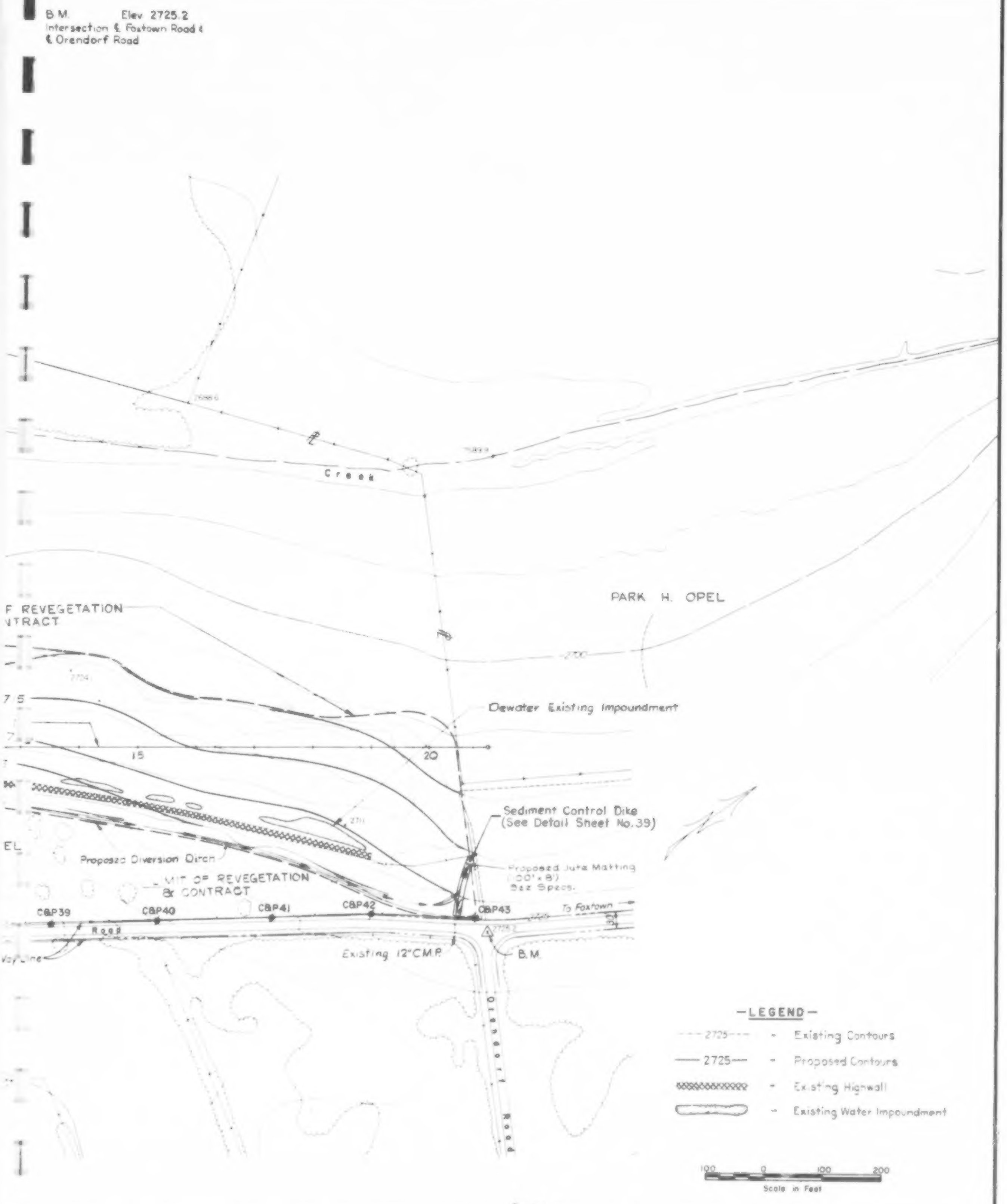
6/5/73
CHARLES C. ZOLLMAN

Prepared by

ZOLLMAN ASSOCIATES, INC.
CONSULTING ENGINEERS
BALTIMORE, MARYLAND

SKELLY & LOY
ENGINEERS – CONSULTANTS
HARRISBURG, PENNSYLVANIA

93


B.M. Elev. 2725.2
Intersection ℄ Foxtown Road &
℄ Orendorf Road
Creek
PARK H. OPEL
F REVEGETATION
NTRACT
Dewater Existing Impoundment
15
20
Sediment Control Dike
(See Detail Sheet No. 39)
Proposed Diversion Ditch
MIT OF REVEGETATION
& CONTRACT
Proposed Jute Matting
(100' x 8')
See Specs.
CBP39
CBP40
CBP41
CBP42
CBP43
To Foxtown
Road
Way Line
Existing 12" CMP
B.M.
Orendorf Road
2700
2725.2
-LEGEND-
2725 - Existing Contours
2725 - Proposed Contours
- Existing Highwall
- Existing Water Impoundment
100 0 100 200
Scale in Feet

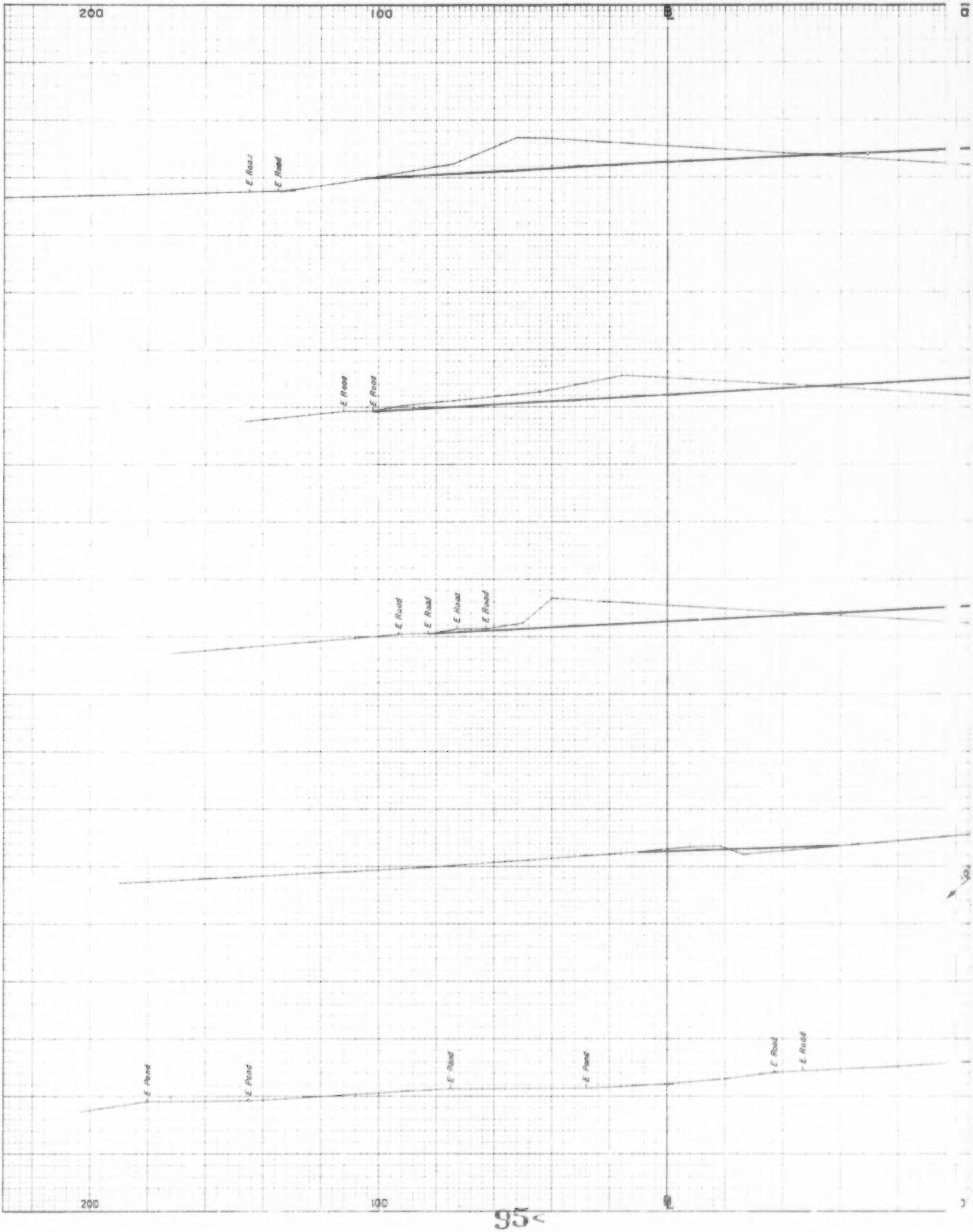
R. Mater

NO.	DATE	REVISIONS

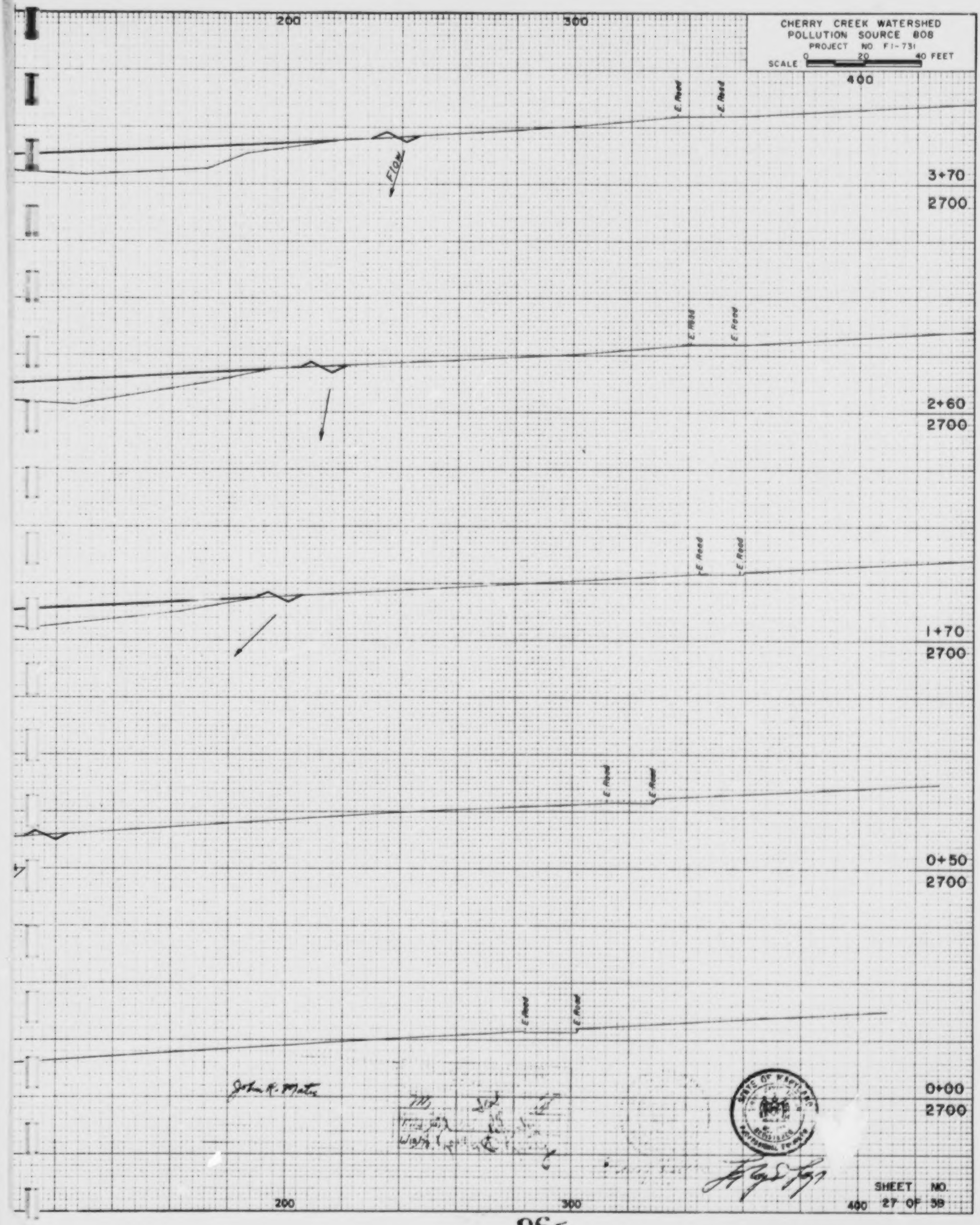
POLLUTION SOURCE NO. 808
PLAN

CHERRY CREEK WATERSHED
MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

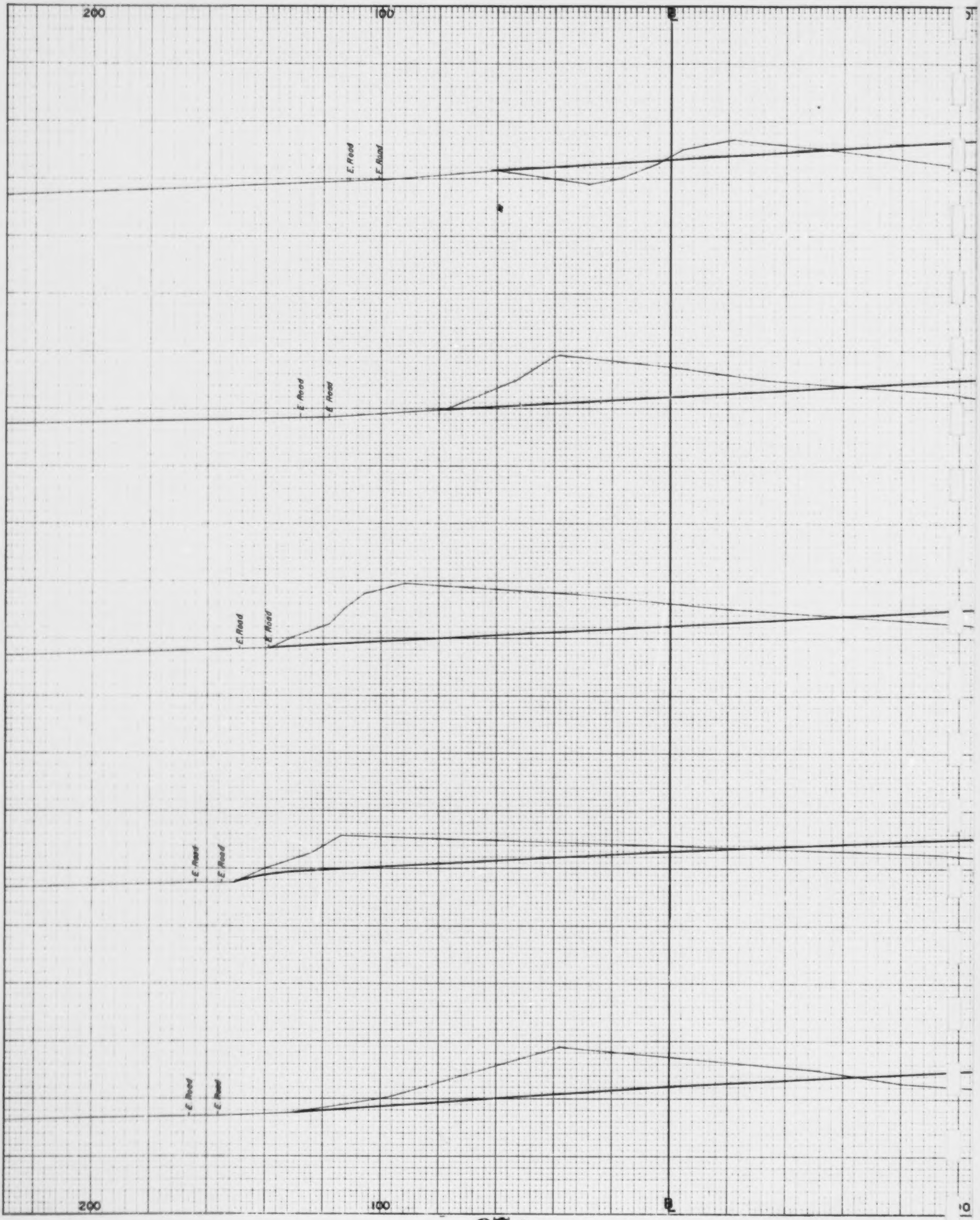
PROJECT NO. FI-731
FUNDS
DATE MAY 1973
DRAWING NO.
SHEET 26 OF 39


200
100
℄
E Road
E Road
E Road
E Road
E Road
E Road
E Road
E Road
E Pond
E Pond
E Road
E Pond
E Road
E Road
200
100
℄

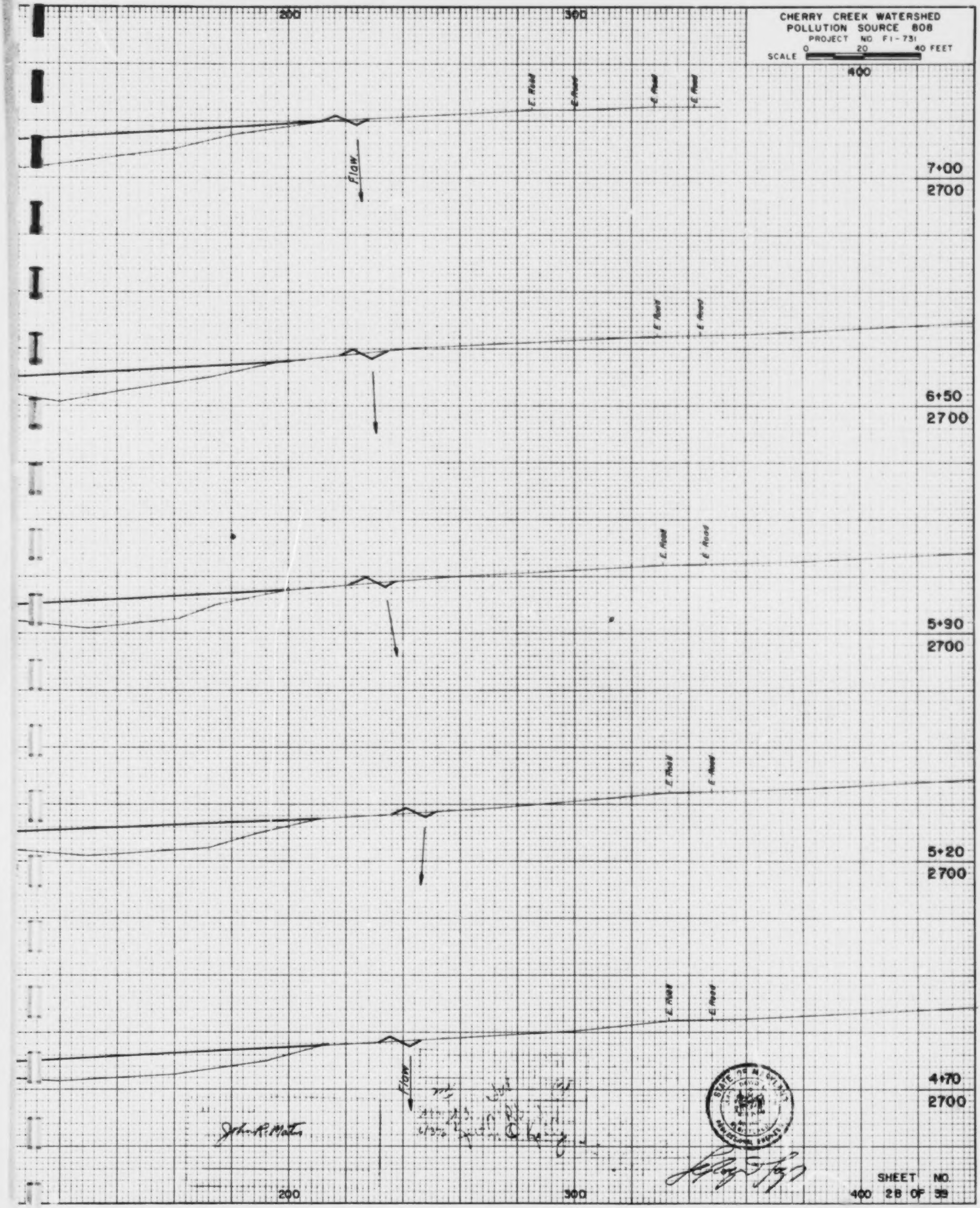
CHERRY CREEK WATERSHED
POLLUTION SOURCE 808
PROJECT NO F1-731


SCALE 0 20 40 FEET
200
300
400
E. Road
E. Road
FLOW
3+70
2700
2+60
2700
1+70
2700
0+50
2700
0+00
2700

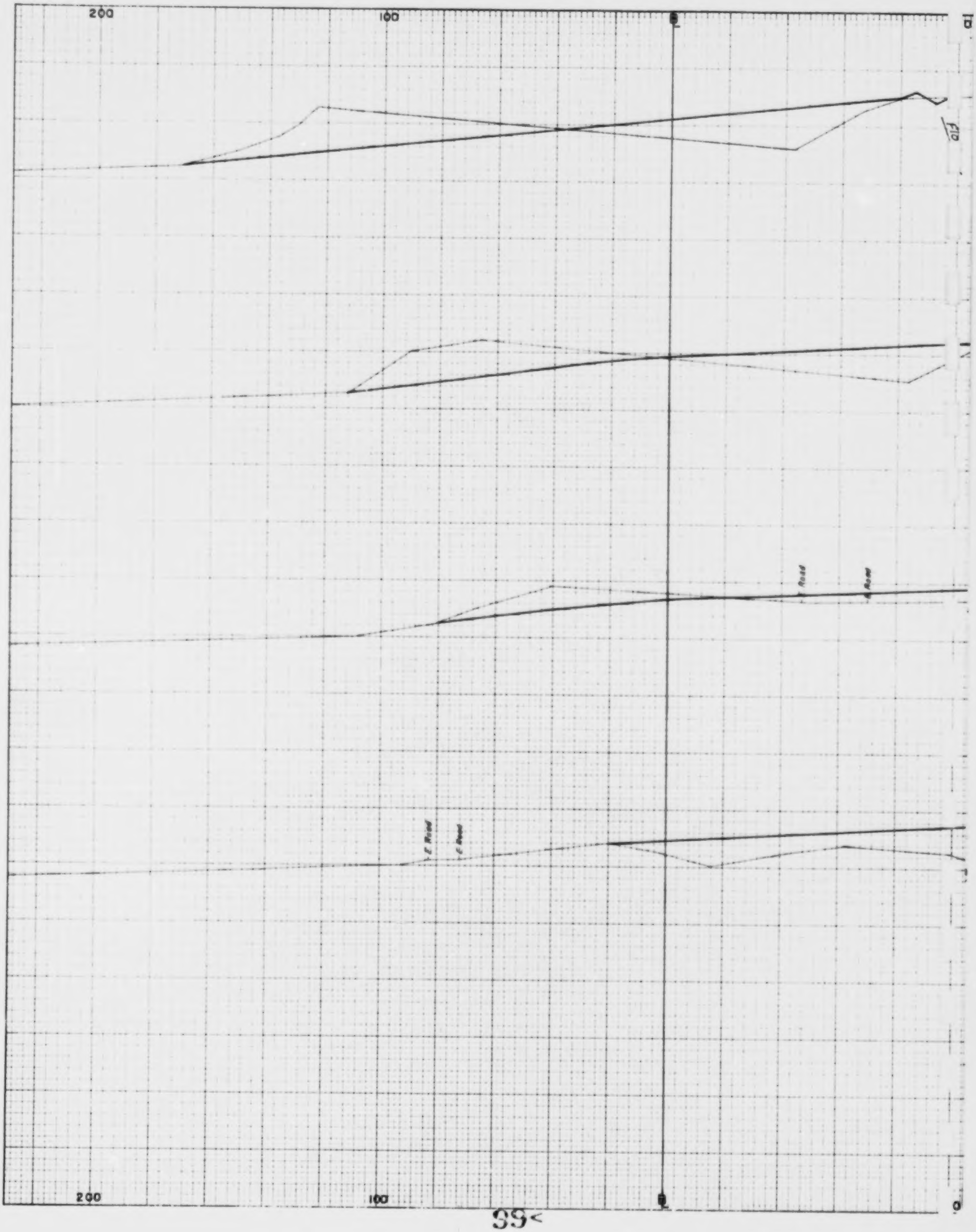
SHEET NO. 27 OF 39


200
100
℄
E. Road
E. Road
E. Road
E. Road
E. Road
E. Road
E. Road
E. Road
E. Road
E. Road
200
100
℄

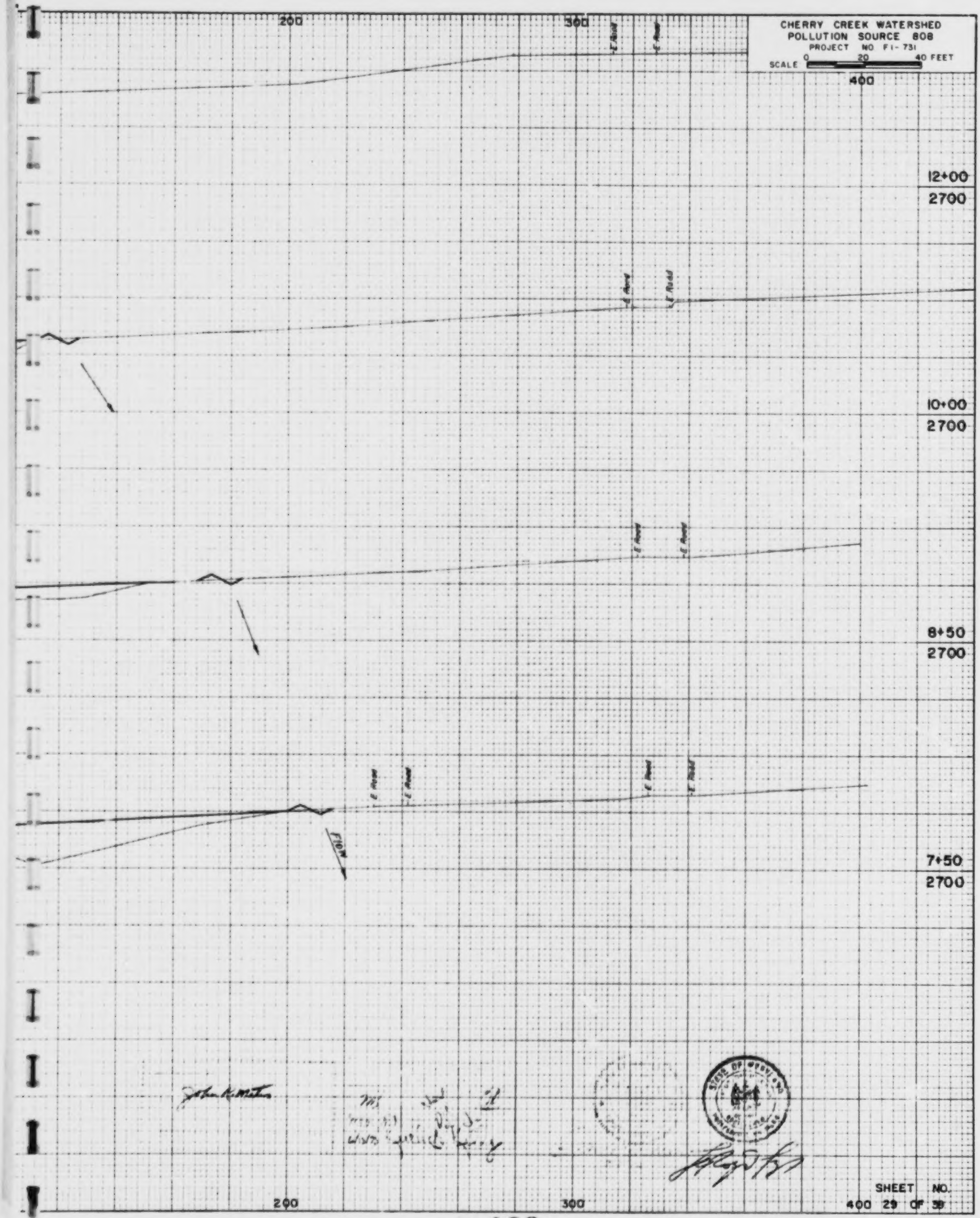
CHERRY CREEK WATERSHED
POLLUTION SOURCE 808
PROJECT NO F1-731
SCALE 0 20 40 FEET


200
300
400
E. Road
E. Road
E. Road
E. Road
Flow
7+00
2700
6+50
2700
5+90
2700
5+20
2700
4+70
2700
Flow

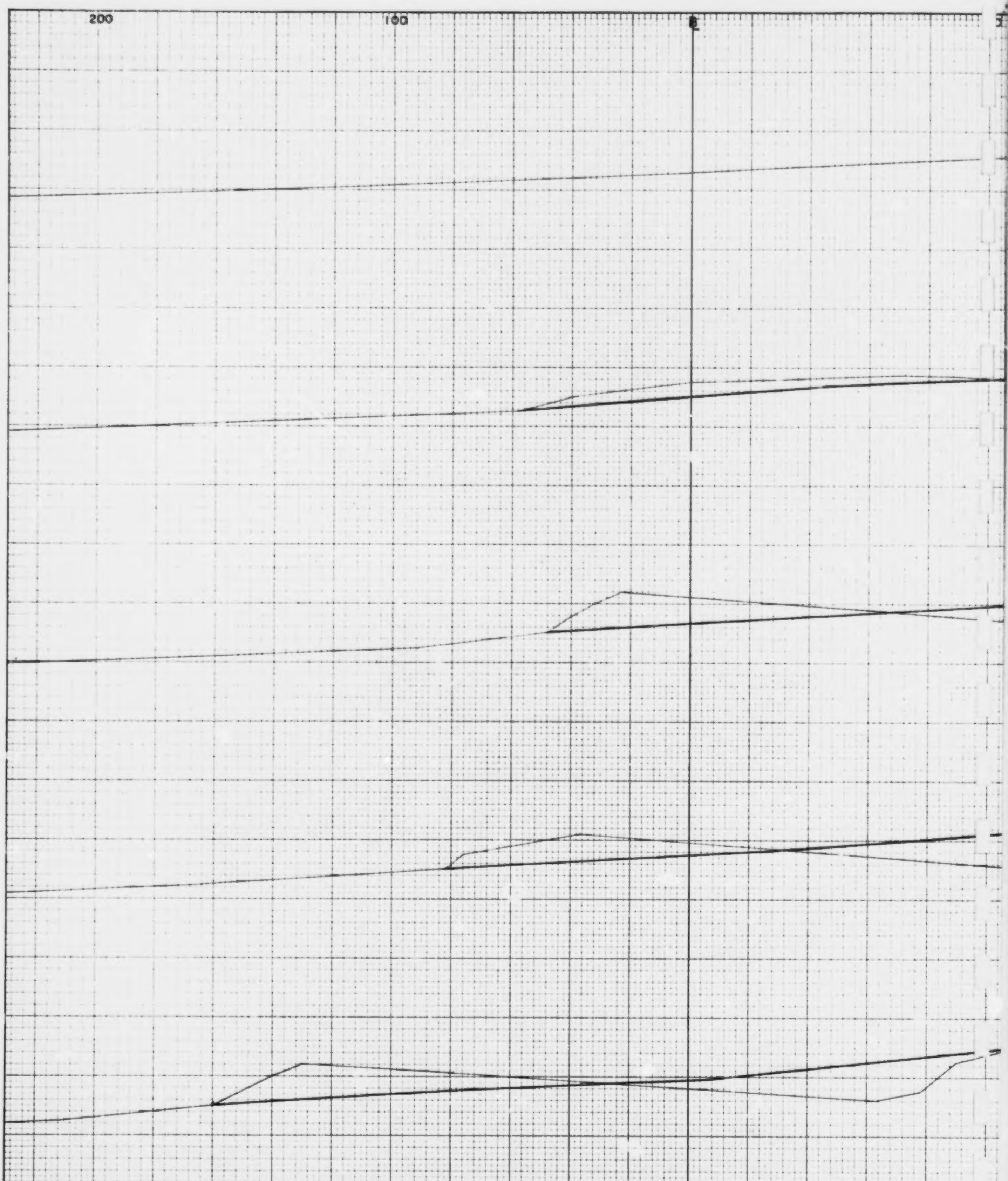
SHEET NO.
28 OF 39


200
100
℄
0
E Road
C Road
F Road
B Road
66

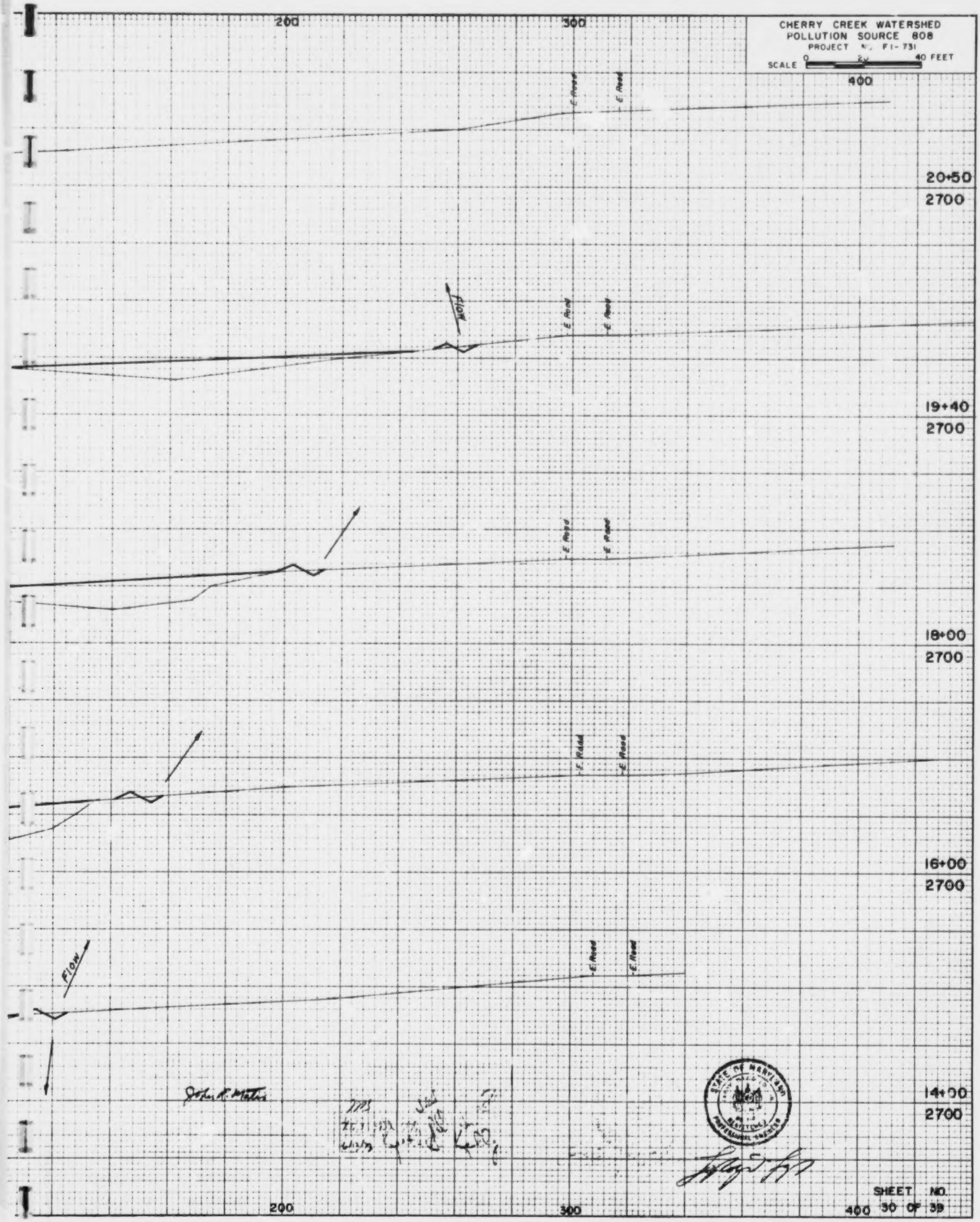
CHERRY CREEK WATERSHED
POLLUTION SOURCE 808
PROJECT NO F1-731
SCALE 0 20 40 FEET


200
300
400
℄ Road
℄ Road
12+00
2700
℄ Road
℄ Road
10+00
2700
℄ Road
℄ Road
8+50
2700
℄ Road
℄ Road
℄ Road
℄ Road
FLOW
7+50
2700
200
300
400

SHEET NO.
29 OF 39


200
100
℄
0
200
100
℄
0

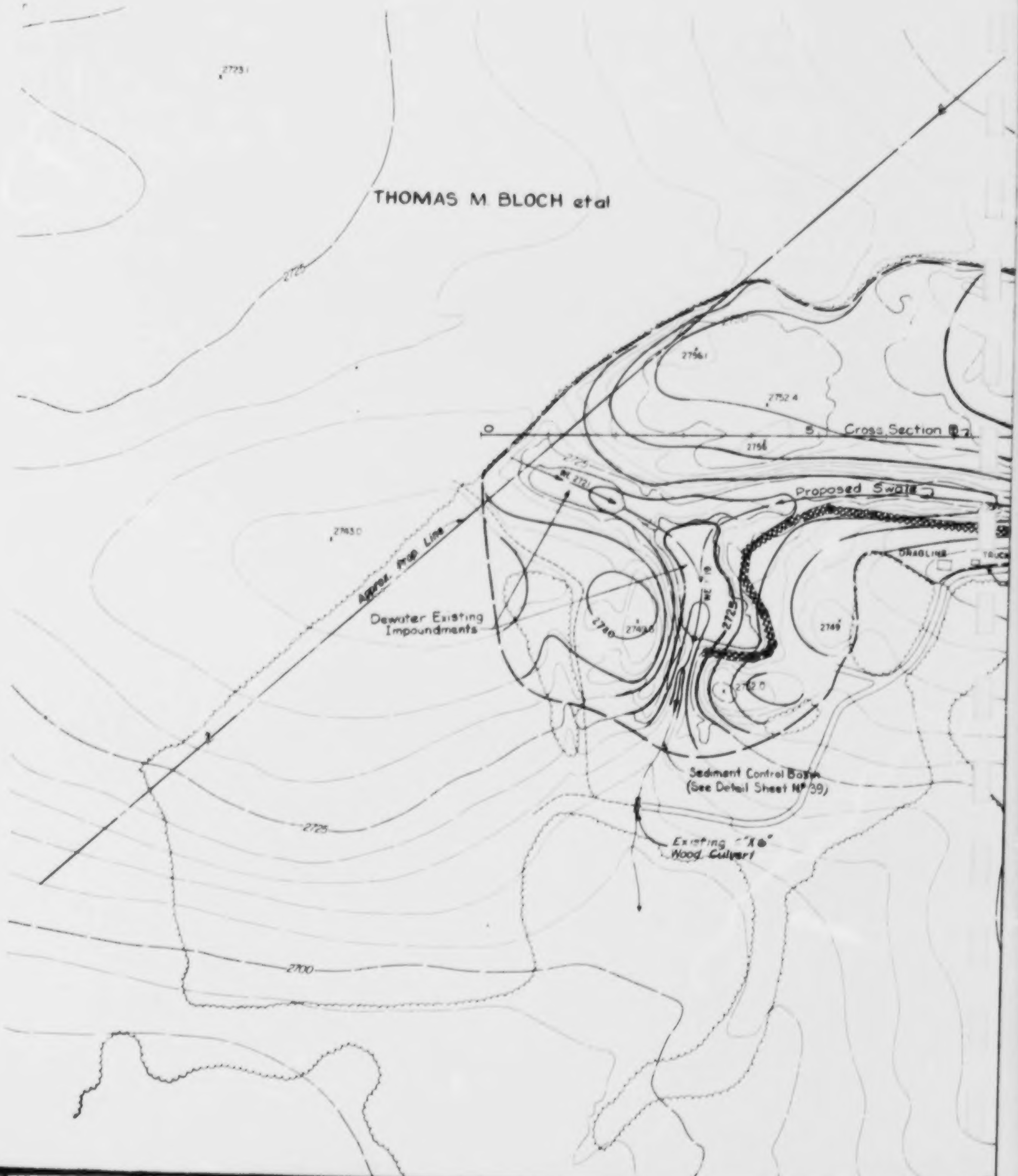
CHERRY CREEK WATERSHED
POLLUTION SOURCE 808
PROJECT No. F1-731
SCALE 0 20 40 FEET


200
300
400
E Road
E Road
20+50
2700
FLOW
E Road
E Road
19+40
2700
E Road
E Road
18+00
2700
E Road
E Road
16+00
2700
FLOW
E Road
E Road
14+00
2700
200
300
400

John R. Matis

STATE OF MARYLAND
REGISTERED PROFESSIONAL ENGINEER

SHEET NO.
30 OF 39


2723.1
THOMAS M. BLOCH etal
2725
2743.0
Approx. Prop. Line
Dewater Existing Impoundments
2756.1
2752.4
0
5
Cross Section B
2756
2725
2721
Proposed Swale
DRAGLINE
TRUCK
2740
2749.6
2725
2749
2732.0
Sediment Control Basin (See Detail Sheet Nº 39)
Existing "X6" Wood Culvert
2725
2700

Prepared by

ZOLLMAN ASSOCIATES, INC.
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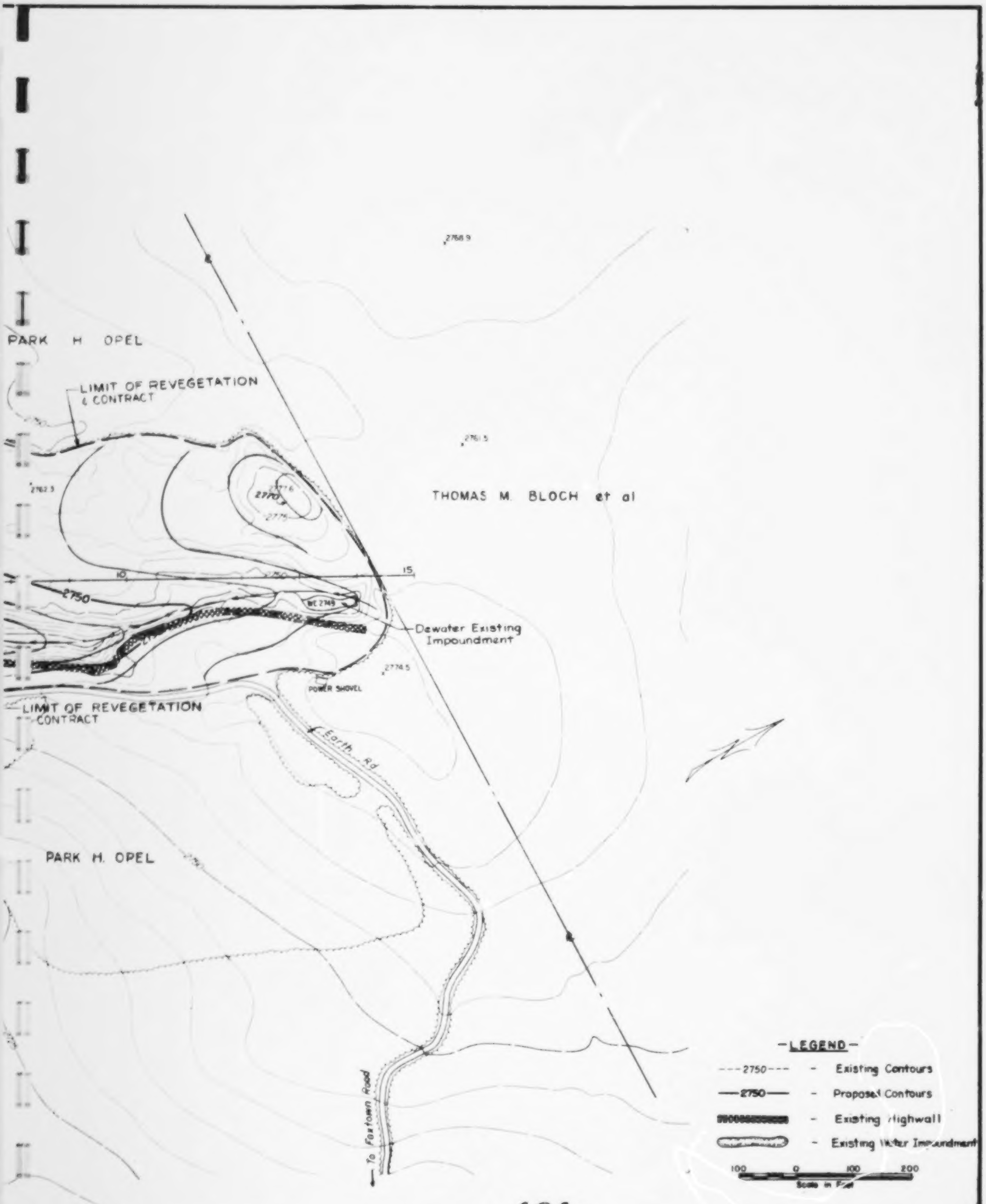
BALTIMORE, MARYLAND

SKELLY & LOY
ENGINEERS - CONSULTANTS
HARRISBURG, PENNSYLVANIA


PARK H. OPEL
LIMIT OF REVEGETATION & CONTRACT
2768.9
2761.5
2762.5
2776
2770
2775
THOMAS M. BLOCH et al
10
15
2750
2750
WE 2749
Dewater Existing Impoundment
2774.5
POWER SHOVEL
LIMIT OF REVEGETATION CONTRACT
Earth Rd
PARK H. OPEL
To Foxtown Road
-LEGEND-
---2750--- - Existing Contours
—2750— - Proposed Contours
- Existing Highwall
- Existing Water Impoundment
100 0 100 200
Scale in Feet

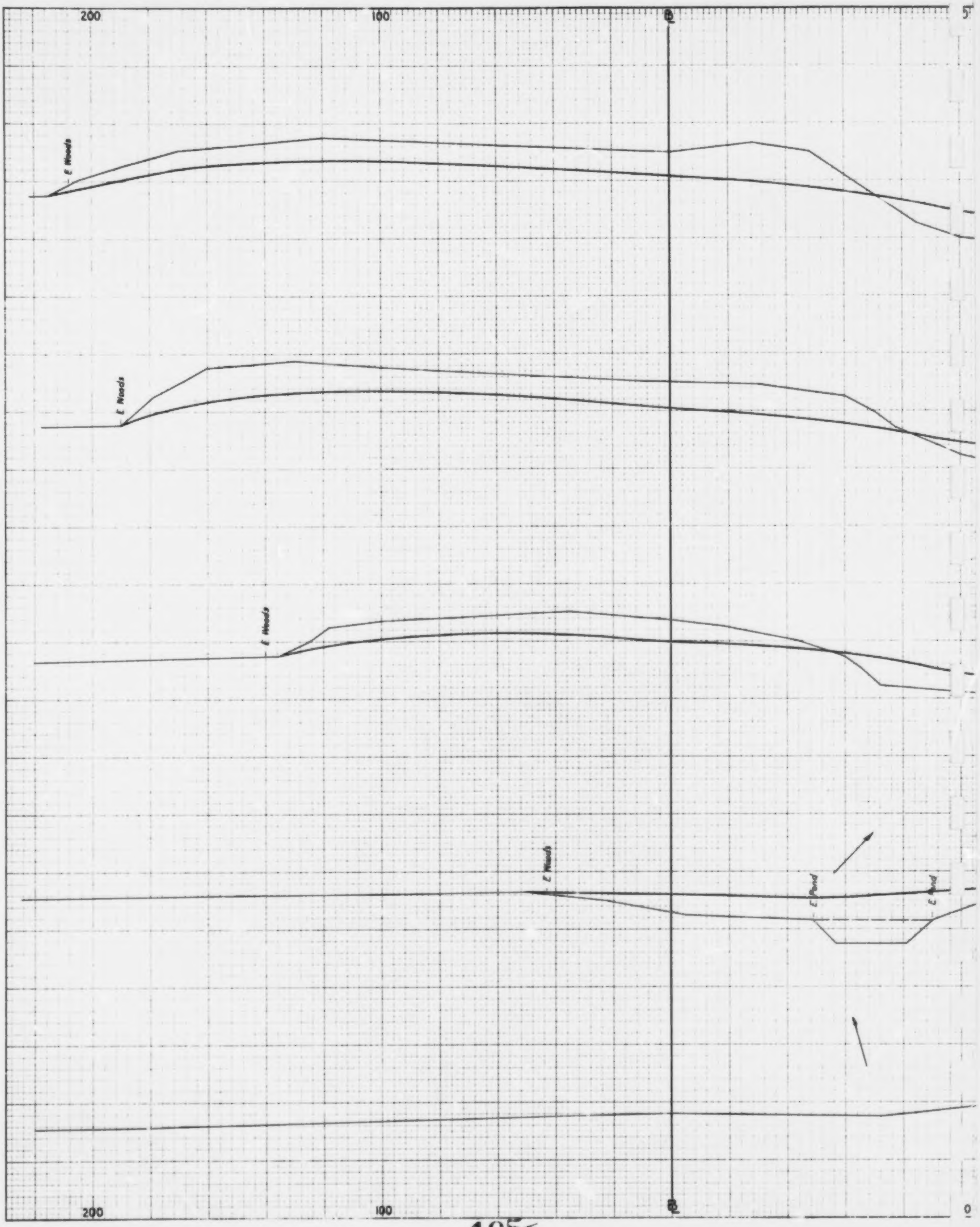
POLLUTION SOURCE NO. 609
PLAN

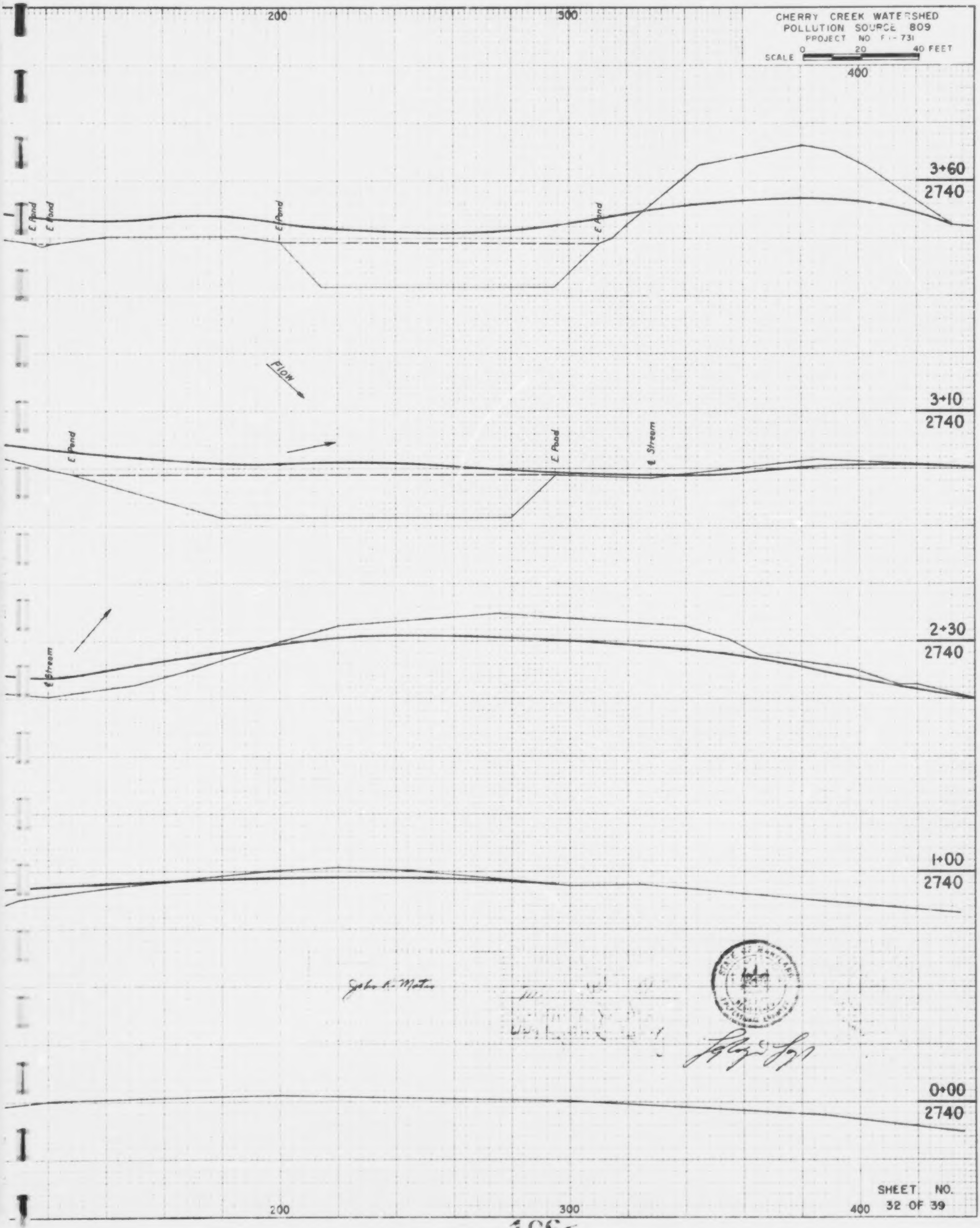
CHERRY CREEK WATERSHED
MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

APPROVED

NO.	DATE	REVISIONS

PROJECT NO. F1-731
FUNDS
DATE MAY 1975
DRAWING NO.
SHEET 31 of 39

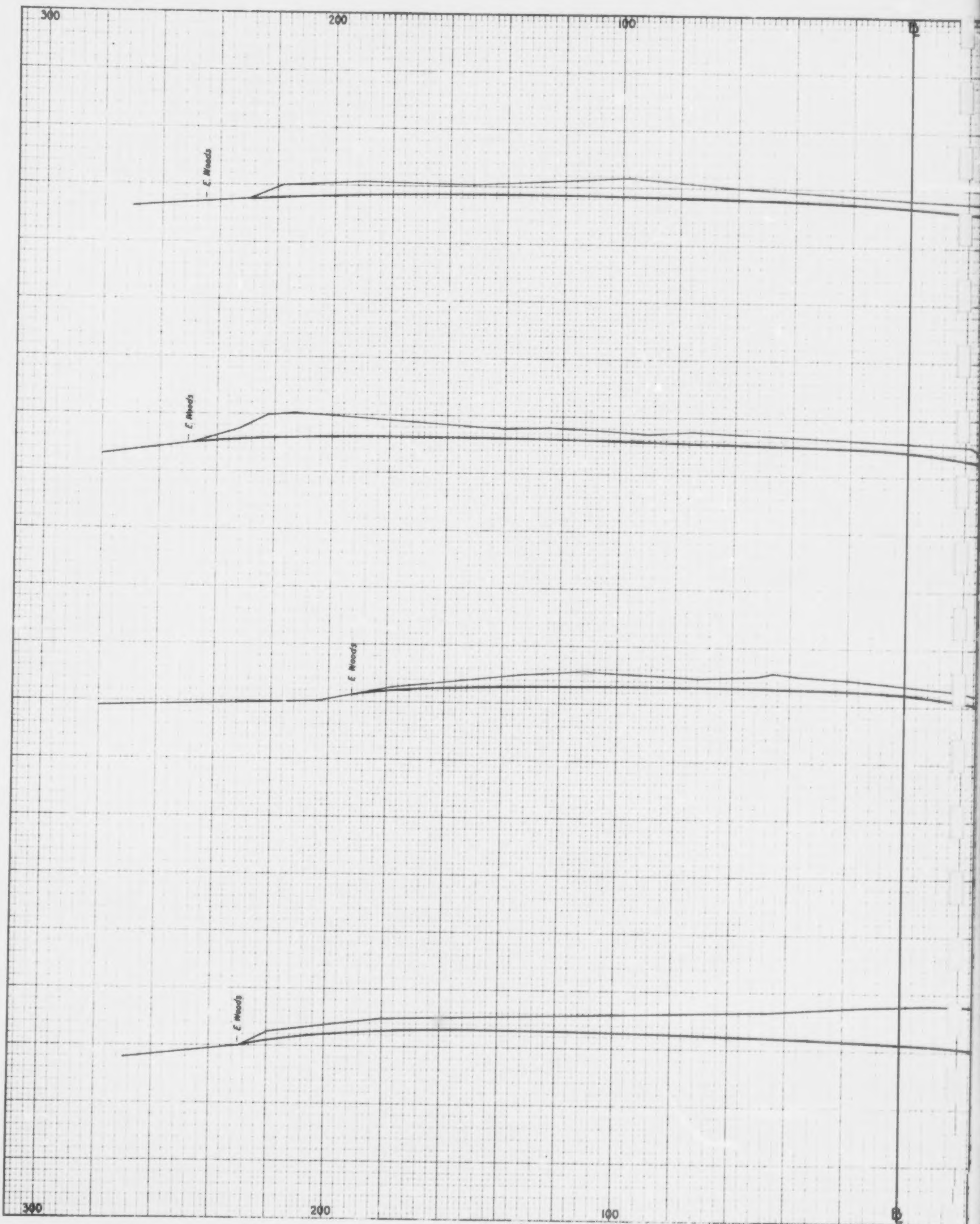

200
100
℄
0
E Woods
E Woods
E Woods
E Woods
E Pond
E Pond
200
100
℄
0

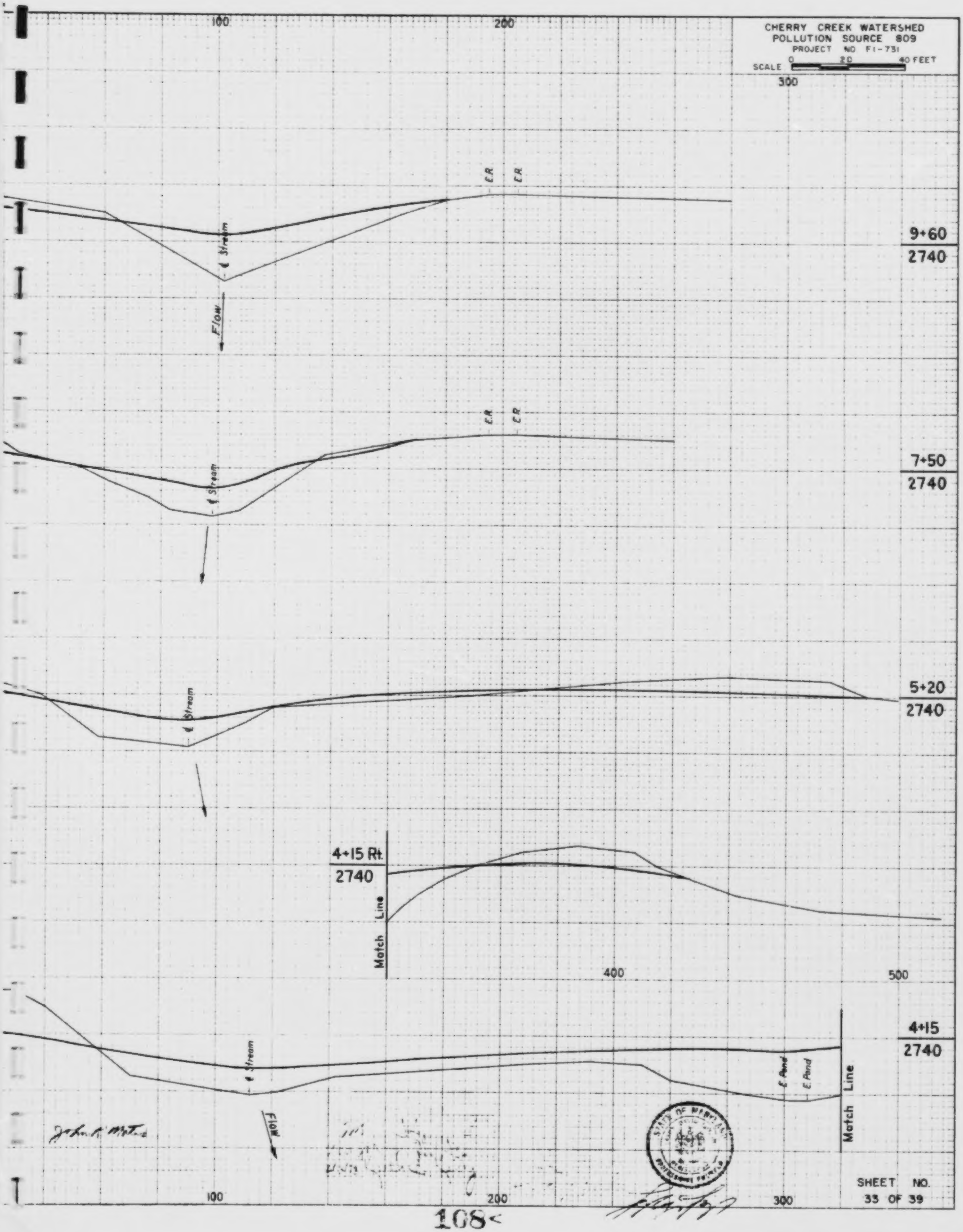

CHERRY CREEK WATERSHED
POLLUTION SOURCE 809
PROJECT NO F-731

SCALE 0 20 40 FEET

SHEET NO.
32 OF 39

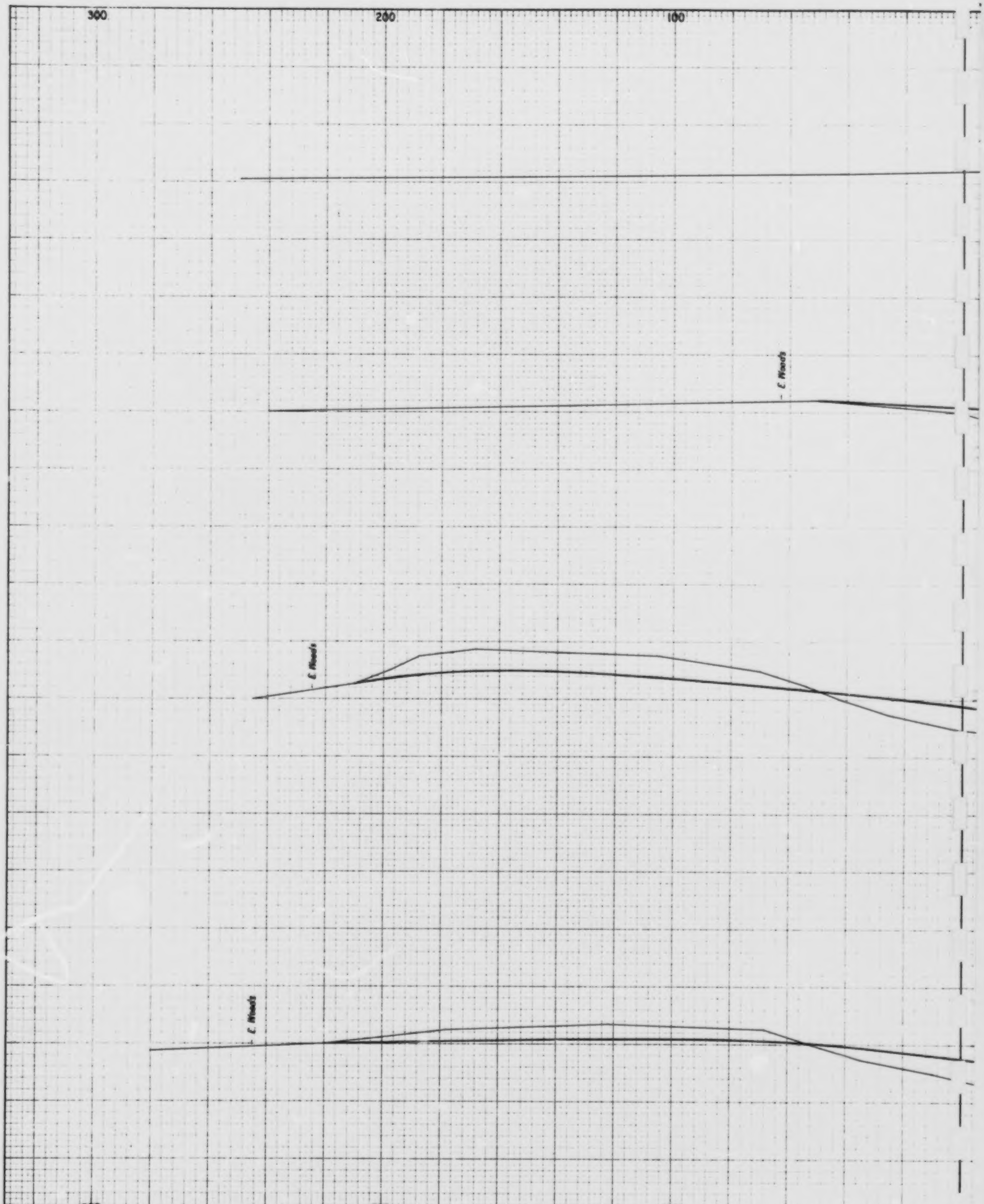
200
300
400
3+60
2740
℄ Pond
℄ Pond
℄ Pond
℄ Pond
FLOW
3+10
2740
℄ Pond
℄ Pond
℄ Stream
2+30
2740
℄ Stream
1+00
2740
0+00
2740
200
300
400

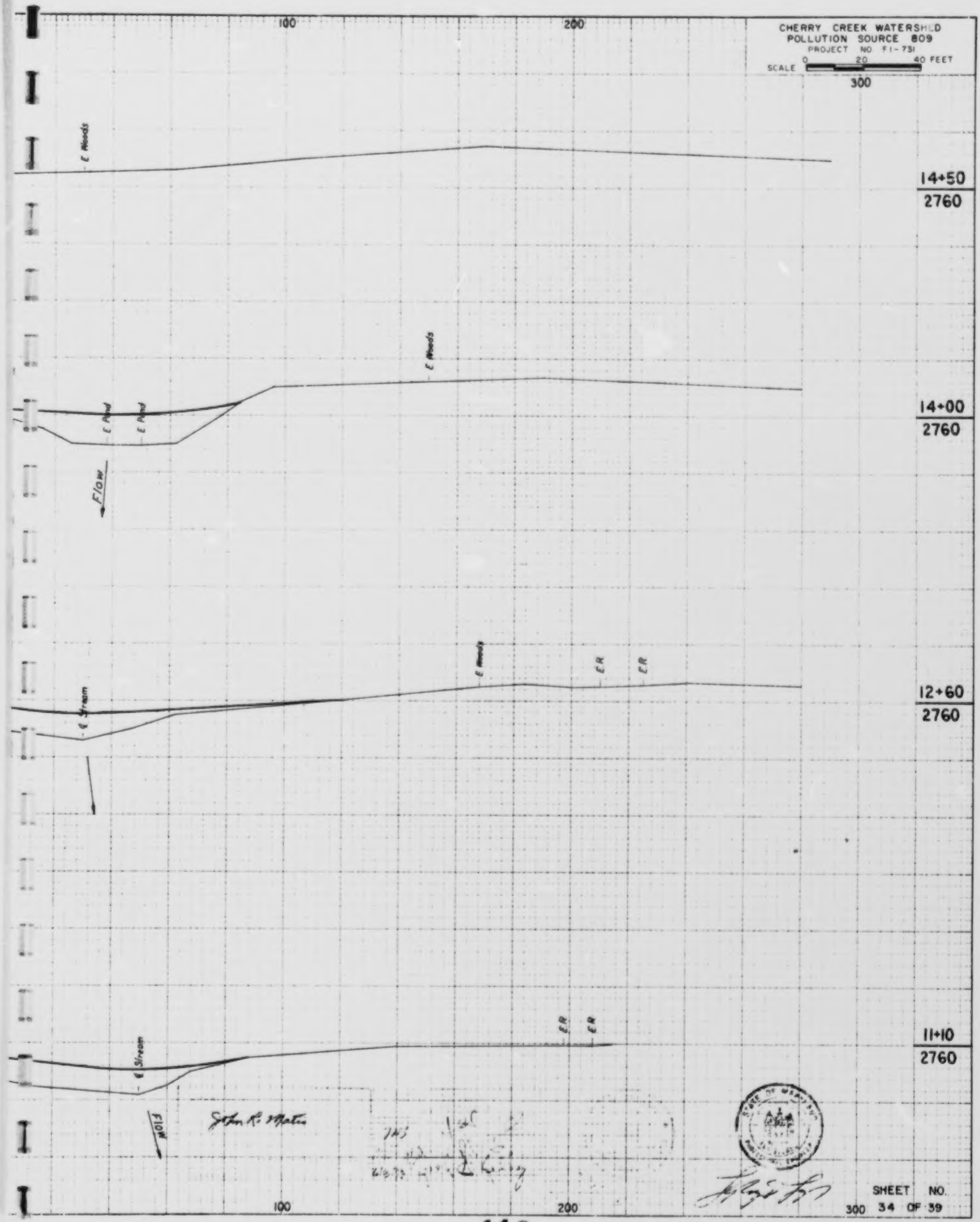

300
200
100
℄
E Woods
E Woods
E Woods
E Woods
300
200
100
℄


CHERRY CREEK WATERSHED
POLLUTION SOURCE 809
PROJECT NO F1-731
SCALE 0 20 40 FEET

100
200
300
E.R.
E.R.
℄ Stream
Flow
9+60
2740
E.R.
E.R.
℄ Stream
7+50
2740
℄ Stream
5+20
2740
4+15 Rt.
2740
Match Line
400
500
℄ Stream
Flow
E. Pond
E. Pond
Match Line
4+15
2740
100
200
300

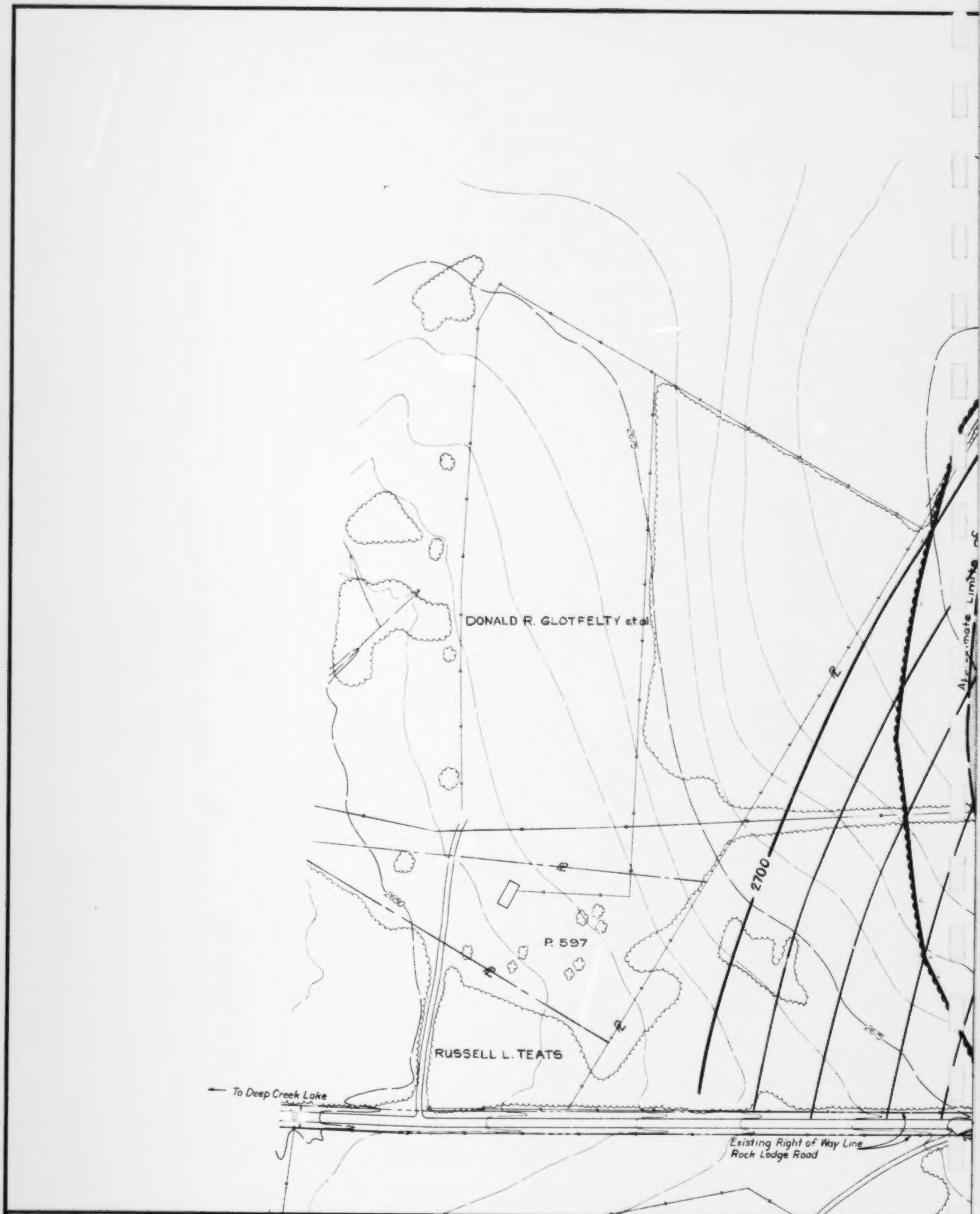
SHEET NO.
33 OF 39


300
200
100
- E. Woods
- E. Woods
- E. Woods
300
200
100


100
200
300
E Woods
14+50
2760
E Woods
E Pond
E Pond
Flow
14+00
2760
E Stream
E Woods
E.R.
E.R.
12+60
2760
E.R.
E.R.
E Stream
FLOW
11+10
2760
100
200
300

CHERRY CREEK WATERSHED
POLLUTION SOURCE 809
PROJECT NO F1-731
SCALE 0 20 40 FEET

SHEET NO.
34 OF 39


DONALD R. GLOTFELTY et al
P. 597
RUSSELL L. TEATS
← To Deep Creek Lake
Existing Right of Way Line
Rock Lodge Road
2700
2650
℄
Approximate Limits

6/3/73

Charles C. Zollman

LeRoy David Loy, Jr.

Prepared by

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BALTIMORE, MARYLAND

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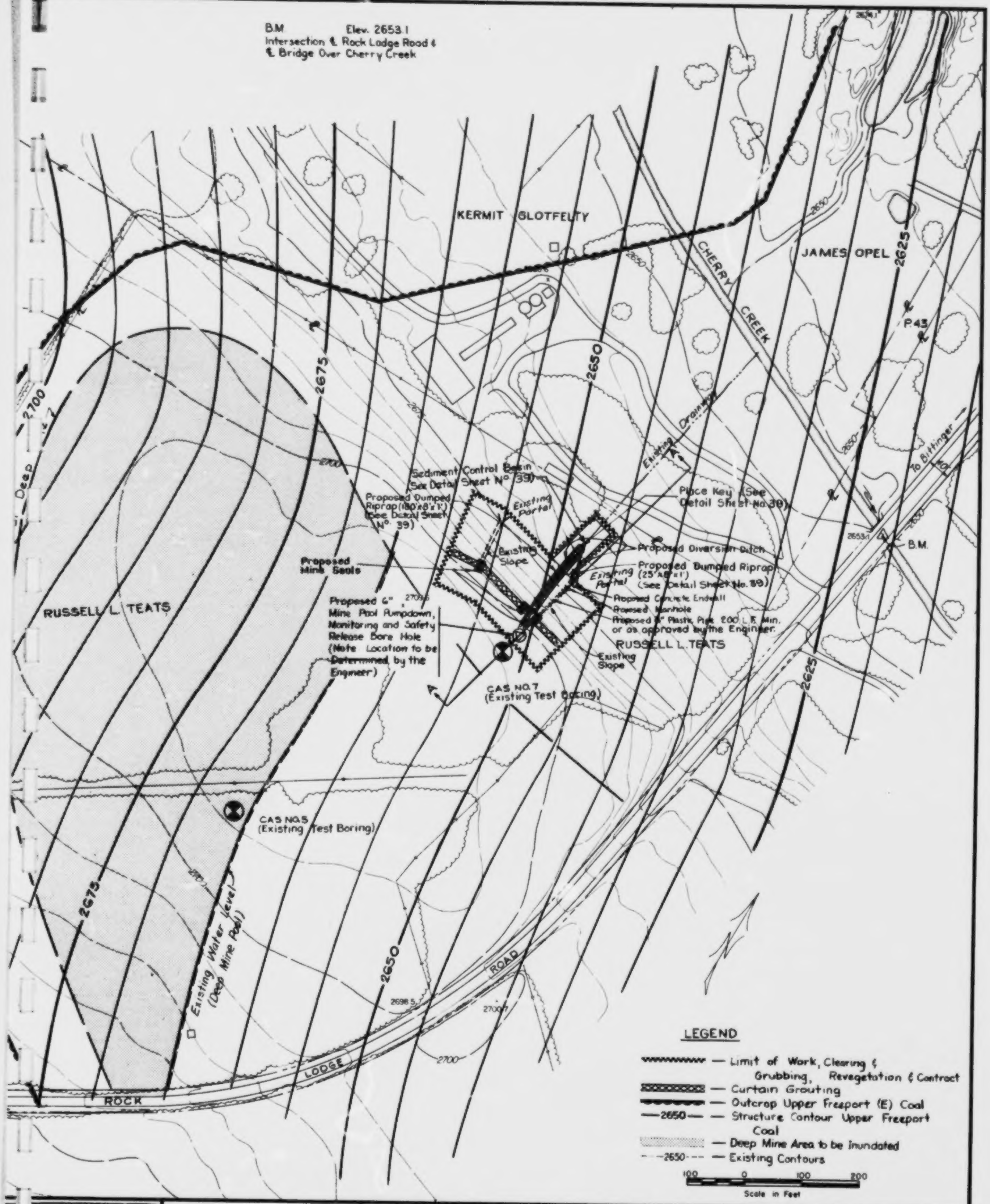
HARRISBURG, PENNSYLVANIA


B.M Elev. 2653.1
Intersection ℄ Rock Lodge Road & ℄ Bridge Over Cherry Creek
KERMIT GLOTFELTY
JAMES OPEL
CHERRY CREEK
RUSSELL L. TEATS
RUSSELL L. TEATS
2700
2675
2650
2625
Deep
P43
To Bittinger Rd
B.M.
2653.1
Existing Drainage
Sediment Control Basin (See Detail Sheet N° 39)
Proposed Dumped Riprap (180'x8'x1') (See Detail Sheet N° 39)
Existing Portal
Existing Slope
Proposed Mine Seals
Place Key (See Detail Sheet No. 39)
Proposed Diversion Ditch
Proposed Dumped Riprap (25'x8'x1') (See Detail Sheet No. 39)
Existing Portal
Proposed Concrete Endwall
Proposed Manhole
Proposed 8" Plastic Pipe 200 L.F. Min. or as approved by the Engineer.
Existing Slope
Proposed 6" Mine Pool Pumpdown, Monitoring and Safety Release Bore Hole (Note Location to be Determined by the Engineer)
2709.6
CAS NO.7 (Existing Test Boring)
CAS NO.5 (Existing Test Boring)
Existing Water Level (Deep Mine Pool)
ROCK LODGE ROAD
2698.5
2700.7
2700
LEGEND
Limit of Work, Clearing & Grubbing, Revegetation & Contract
Curtain Grouting
Outcrop Upper Freeport (E) Coal
2650 — Structure Contour Upper Freeport Coal
Deep Mine Area to be Inundated
2650 — Existing Contours
100 0 100 200
Scale in Feet

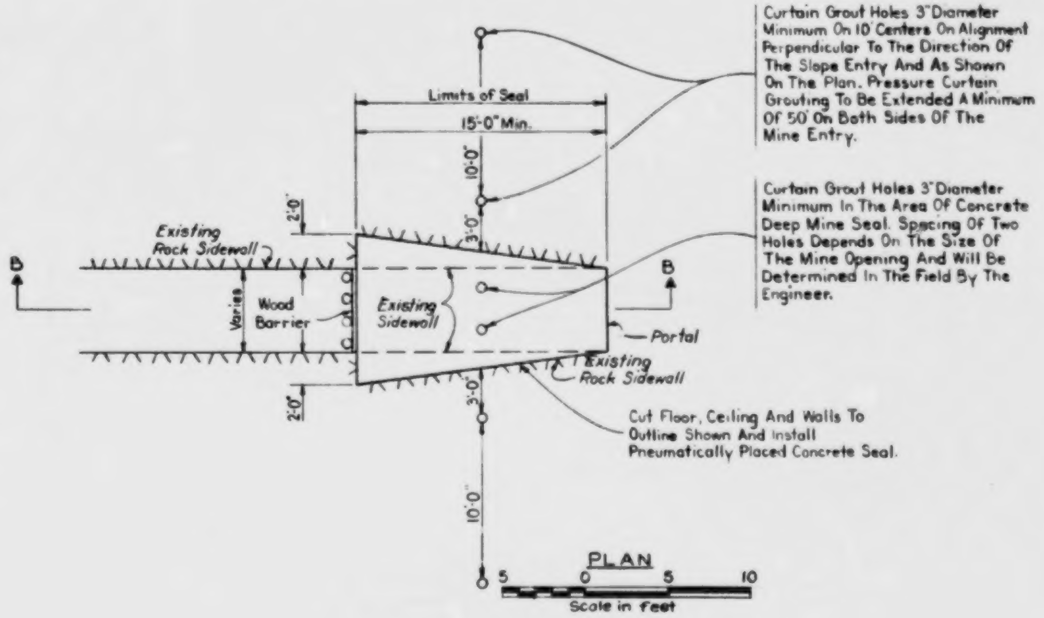
DEPARTMENT OF GENERAL SERVICES
OFFICE OF DESIGN & CONSTRUCTION
APPROVED
PRINC PRJ ENG. | PRINCIPAL PLAN | PRINCIPAL ARCH
S.E. | M.E. | E.E. | C.E. | SPEC | ARCH
DATE
Keith D Kelly

NO	DATE	REVISIONS

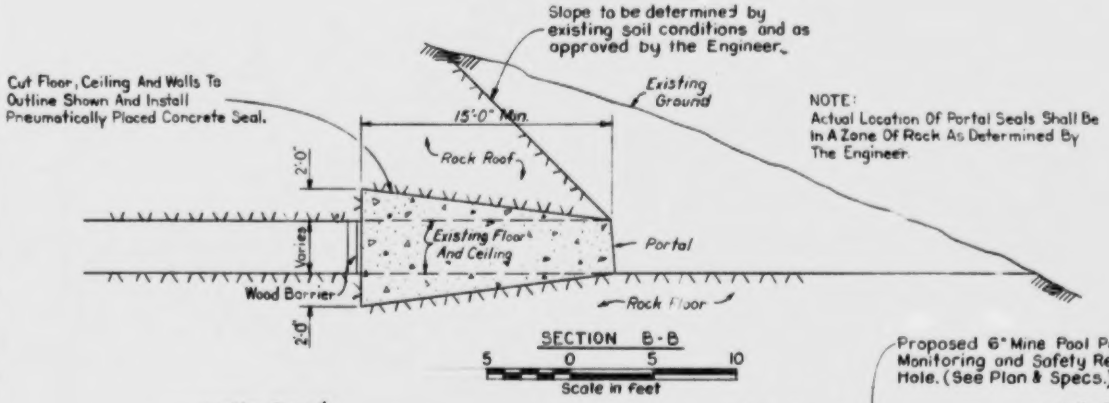
POLLUTION SOURCE NO. 902
PLAN

CHERRY CREEK WATERSHED
MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

PROJECT NO FI-731
FUNDS
DATE MAY 1973
DRAWING NO.
SHEET 35 OF 39

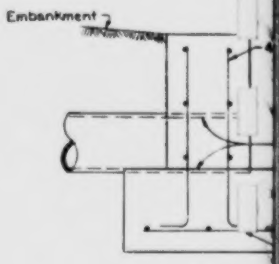

Curtain Grout Holes 3" Diameter Minimum On 10' Centers On Alignment Perpendicular To The Direction Of The Slope Entry And As Shown On The Plan. Pressure Curtain Grouting To Be Extended A Minimum Of 50' On Both Sides Of The Mine Entry.
Limits of Seal
15'-0" Min.
10'-0"
3'-0"
2'-0"
Curtain Grout Holes 3" Diameter Minimum In The Area Of Concrete Deep Mine Seal. Spacing Of Two Holes Depends On The Size Of The Mine Opening And Will Be Determined In The Field By The Engineer.
Existing Rock Sidewall
B
B
Varies
Wood Barrier
Existing Sidewall
Portal
Existing Rock Sidewall
2'-0"
3'-0"
Cut Floor, Ceiling And Walls To Outline Shown And Install Pneumatically Placed Concrete Seal.
10'-0"
5
0
5
10
Scale in Feet

PLAN

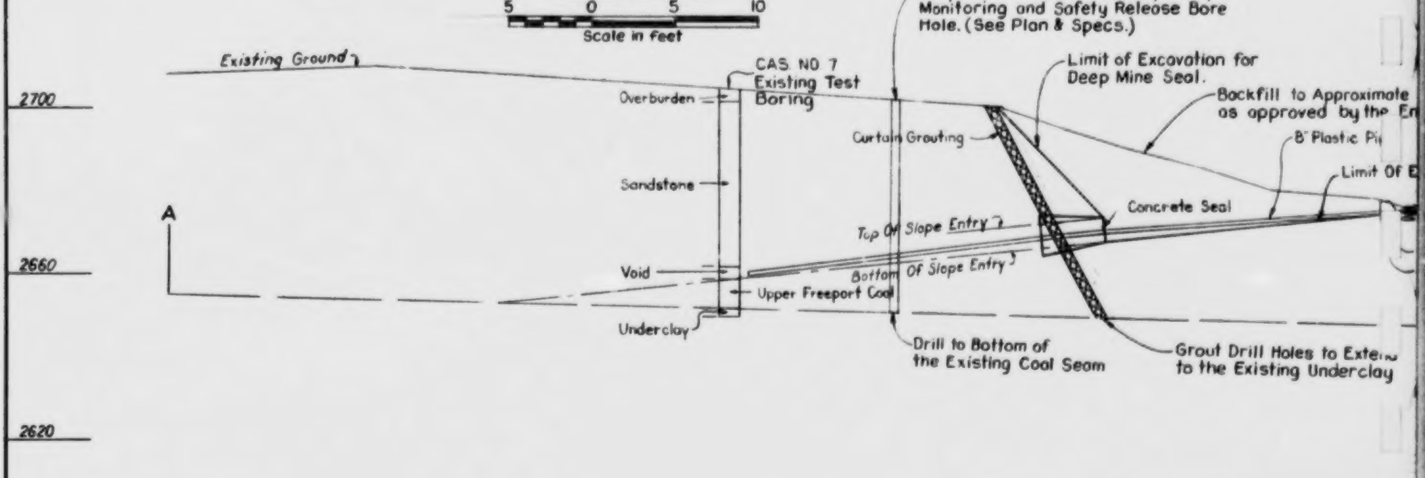

Slope to be determined by existing soil conditions and as approved by the Engineer.
Cut Floor, Ceiling And Walls To Outline Shown And Install Pneumatically Placed Concrete Seal.
Existing Ground
15'-0" Min.
2'-0"
Rock Roof
Varies
Existing Floor And Ceiling
Portal
Wood Barrier
Rock Floor
2'-0"
5
0
5
10
Scale in Feet

NOTE:
Actual Location Of Portal Seals Shall Be In A Zone Of Rock As Determined By The Engineer.

SECTION B-B


Embankment

SIDE VIEW


Proposed 6" Mine Pool Pumpdown, Monitoring and Safety Release Bore Hole. (See Plan & Specs.)
Existing Ground
CAS. NO 7 Existing Test Boring
Limit of Excavation for Deep Mine Seal.
Backfill to Approximate as approved by the En
2700
Overburden
Curtain Grouting
8" Plastic Pi
Limit Of E
Sandstone
Concrete Seal
A
Top Of Slope Entry
2660
Void
Bottom Of Slope Entry
Upper Freeport Coal
Underclay
Drill to Bottom of the Existing Coal Seam
Grout Drill Holes to Exten to the Existing Underclay
2620

6/3/75

Charles C. Zollman

Louis David Loy, Jr.

Prepared by

ZOLLMAN ASSOCIATES, INC.
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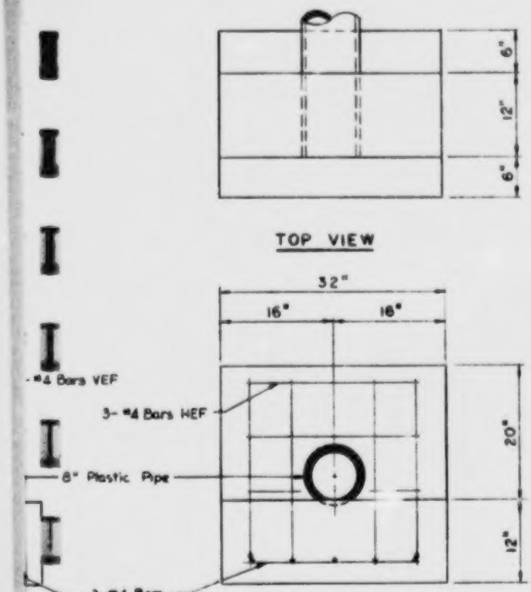
BALTIMORE, MARYLAND

SKELLY & LOY
ENGINEERS - CONSULTANTS
HARRISBURG, PENNSYLVANIA

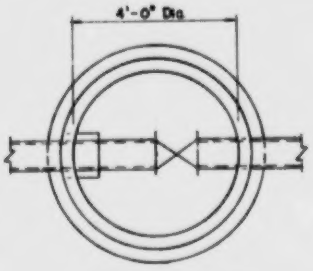

6"
12"
6"
32"
16"
16"
-#4 Bars VEF
3- #4 Bars HEF
8" Plastic Pipe
20"
12"
3- #4 Bars E.W.

TOP VIEW

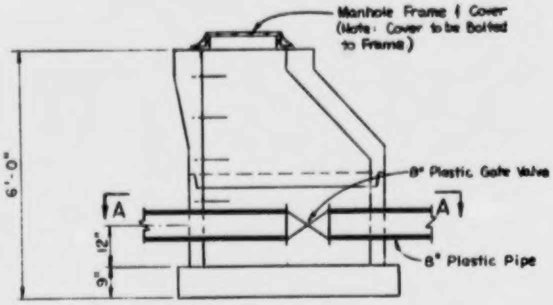
FRONT VIEW

CONCRETE ENDWALL

1 0 1
Scale in feet

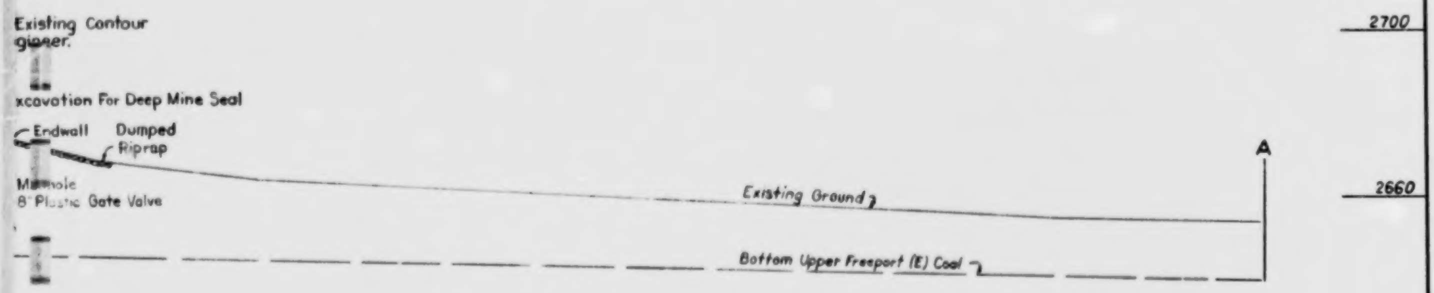


SECTION A-A


Manhole Frame & Cover
(Note: Cover to be Bolted to Frame)
6'-0"
8" Plastic Gate Valve
A
A
12"
9"
8" Plastic Pipe

MANHOLE DETAIL

2 0 2
Scale in feet


Existing Contour
gineer.
xcavation For Deep Mine Seal
Endwall
Dumped Riprap
Manhole
8" Plastic Gate Valve
Existing Ground
Bottom Upper Freeport (E) Coal
A
2700
2660
2620

SECTION A-A

20 0 20 40
Scale in feet

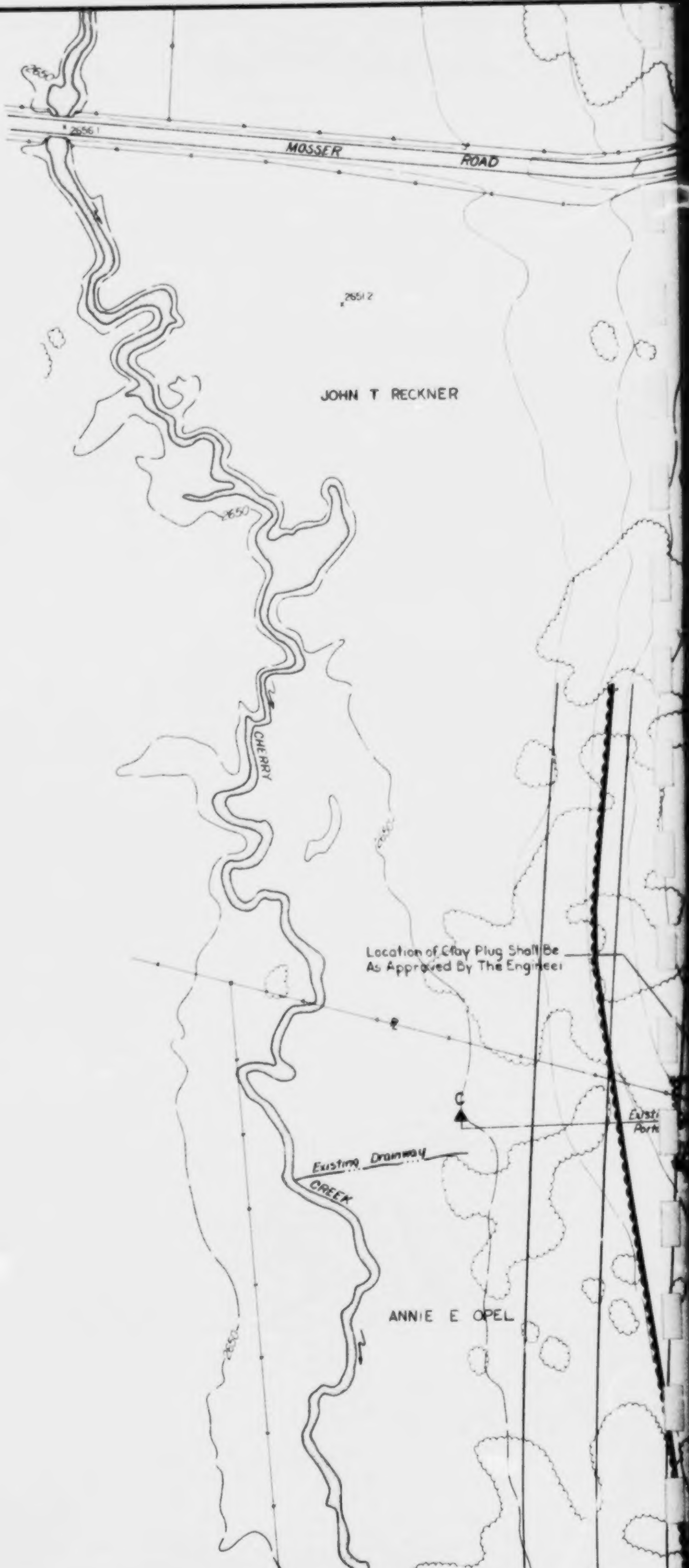
DEPARTMENT OF GENERAL SERVICES
OFFICE OF DESIGN & CONSTRUCTION
APPROVED

NO.	DATE	REVISIONS

POLLUTION SOURCE NO. 902
DETAILS

CHERRY CREEK WATERSHED
MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

PROJECT NO. FI-731
DATE MAY 1973
SHEET 36 OF 39


MOSSER ROAD
2556.1
2655.7
2651.2
JOHN T RECKNER
2650
CHERRY
CREEK
Location of Clay Plug Shall Be As Approved By The Engineer
C
Existing Drainway
Existi
Porti
ANNIE E OPEL
2650

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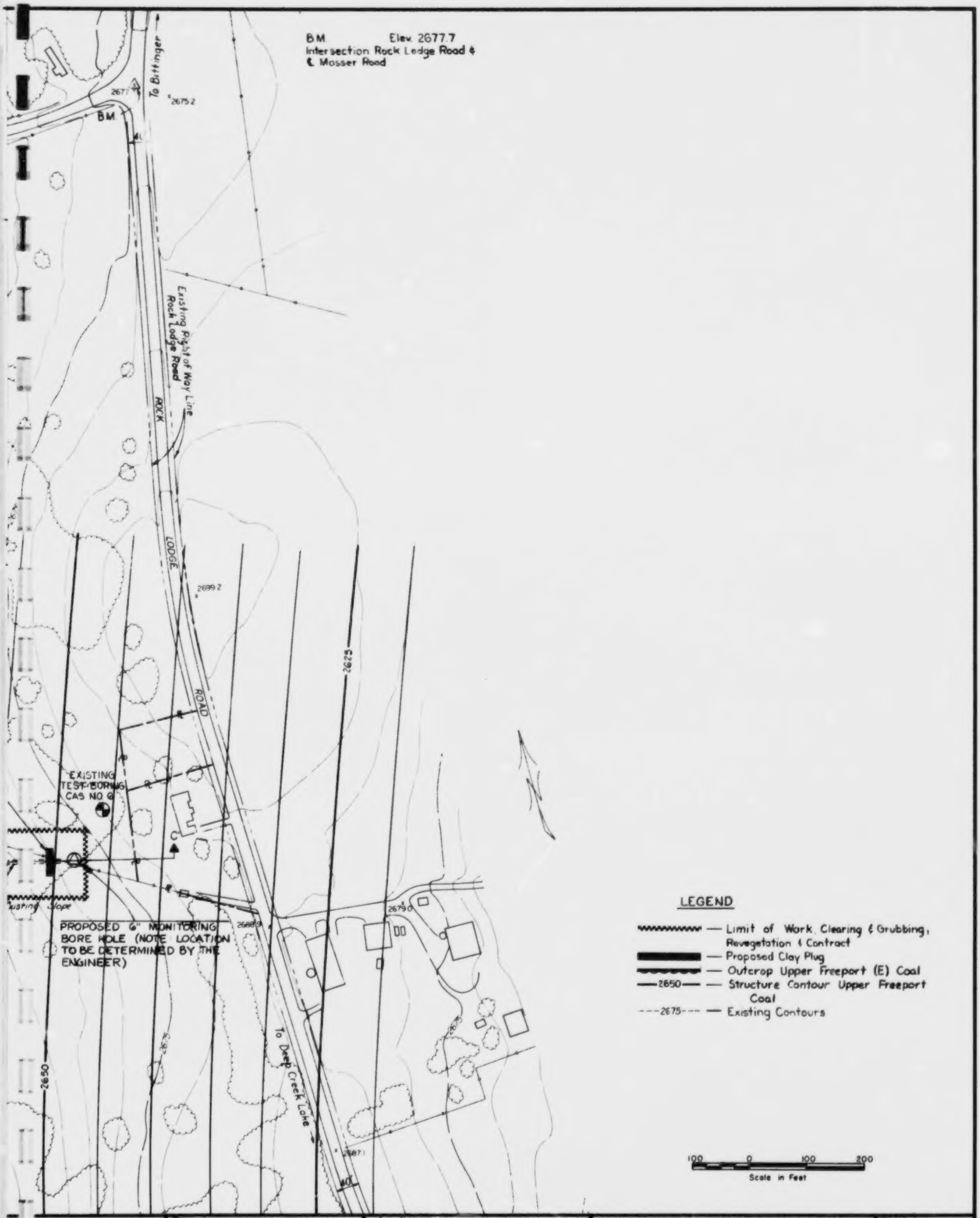
HARRISBURG, PENNSYLVANIA


B.M. Elev. 2677.7
Intersection Rock Lodge Road & ℄ Mosser Road
BM
2677
To Bittinger
2675.2
Existing Right of Way Line Rock Lodge Road
ROCK
LODGE
ROAD
2699.2
2625
EXISTING TEST BORING CAS NO 6
Existing Slope
PROPOSED 6" MONITORING BORE HOLE (NOTE LOCATION TO BE DETERMINED BY THE ENGINEER)
2688.9
2679.0
To Deep Creek Lane
2687.1
2650
2675
N
LEGEND
— Limit of Work, Clearing & Grubbing, Revegetation & Contract
— Proposed Clay Plug
— Outcrop Upper Freeport (E) Coal
—2650— — Structure Contour Upper Freeport Coal
---2675--- — Existing Contours
100 0 100 200
Scale in Feet

John R. McInn

APPROVED

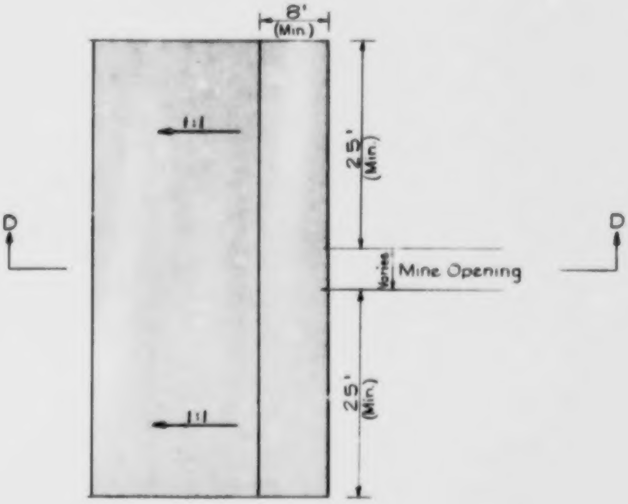
DATE 6/9/73 Keith S. Kelly

NO	DATE	REVISIONS

POLLUTION SOURCE NO. 904
PLAN

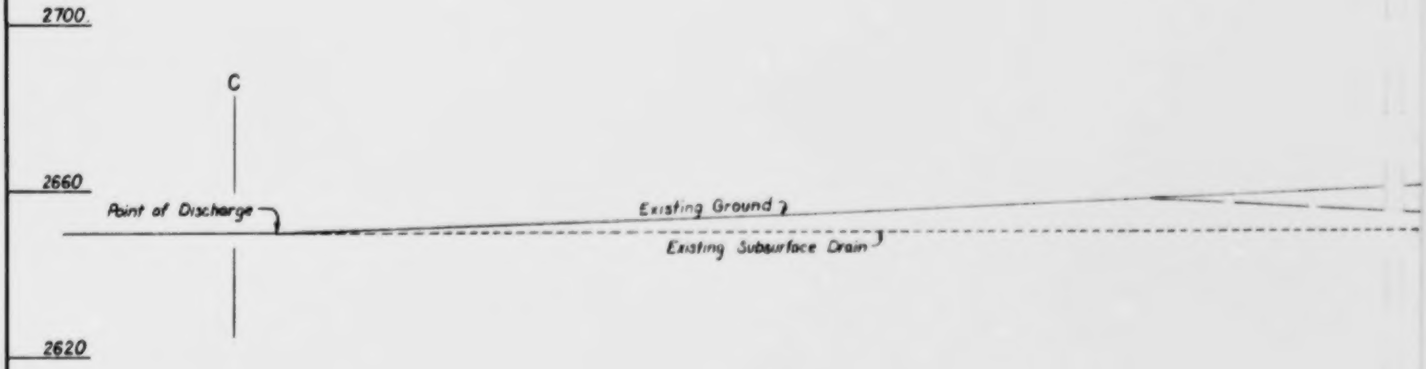
CHERRY CREEK WATERSHED
MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

PROJECT NO. F1-731
FUNDS
DATE MAY 1973
DRAWING NO.
SHEET 37 OF 39


8'
(Min.)
1:1
25'
(Min.)
D
D
Varies
Mine Opening
1:1
25'
(Min.)

PLAN

10
0
10
20
Scale in Feet


2700
C
2660
Point of Discharge
Existing Ground
Existing Subsurface Drain
2620

6/8/73

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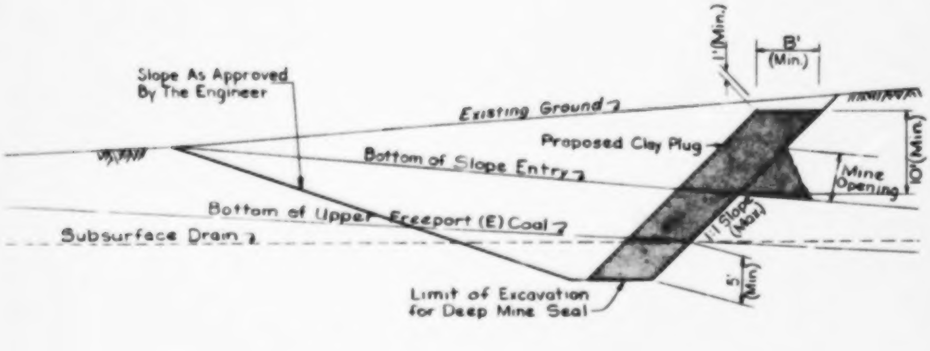
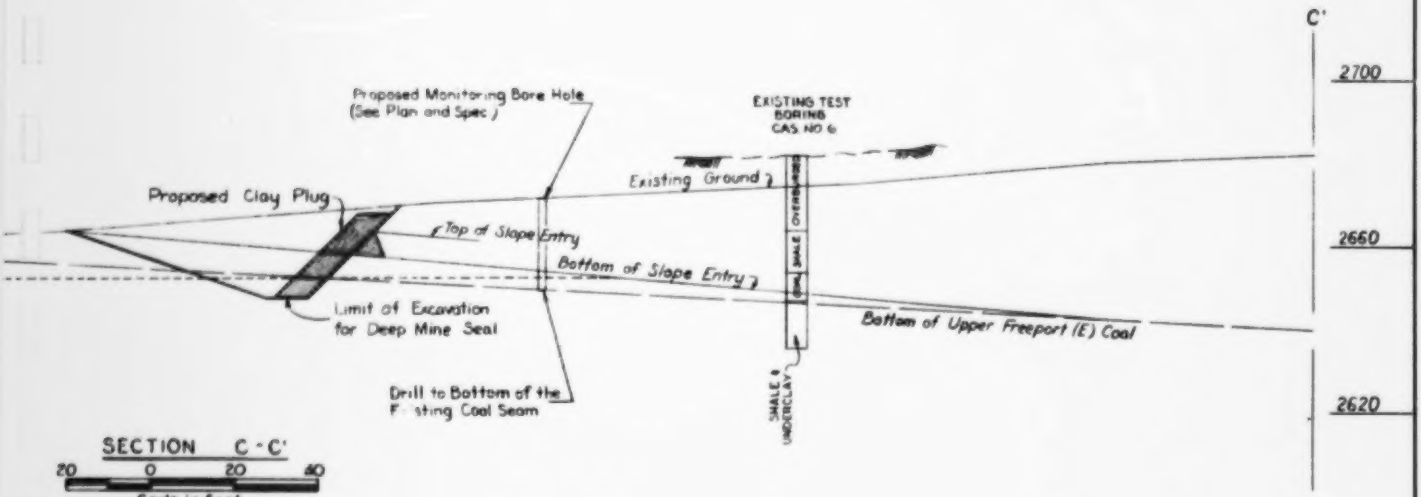
117


Slope As Approved By The Engineer
Existing Ground
Proposed Clay Plug
Bottom of Slope Entry
Bottom of Upper Freeport (E) Coal
Subsurface Drain
Limit of Excavation for Deep Mine Seal
1' (Min.)
B' (Min.)
10' (Min.)
Mine Opening
1:1 Slope (Max)
5' (Min)
10 0 10 20
Scale in Feet

SECTION D-D


C'
2700
2660
2620
Proposed Monitoring Bore Hole (See Plan and Spec.)
EXISTING TEST BORING CAS NO 6
OVERBURDEN
SHALE
COAL
SHALE & UNDERCLAY
Existing Ground
Proposed Clay Plug
Top of Slope Entry
Bottom of Slope Entry
Bottom of Upper Freeport (E) Coal
Limit of Excavation for Deep Mine Seal
Drill to Bottom of the Existing Coal Seam
20 0 20 40
Scale in feet

SECTION C-C'

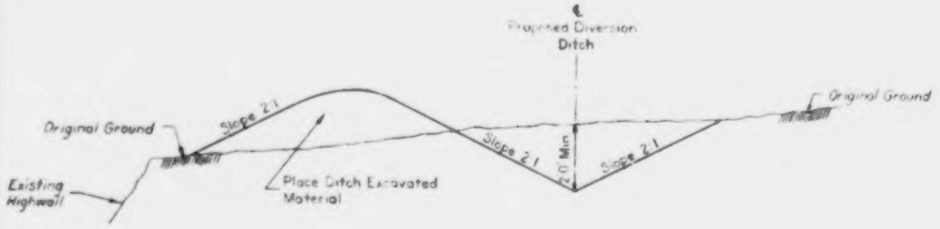
DEPARTMENT OF GENERAL SERVICES
OFFICE OF DESIGN & CONSTRUCTION
APPROVED

NO.	DATE	REVISIONS

POLLUTION SOURCE NO. 904
DETAILS

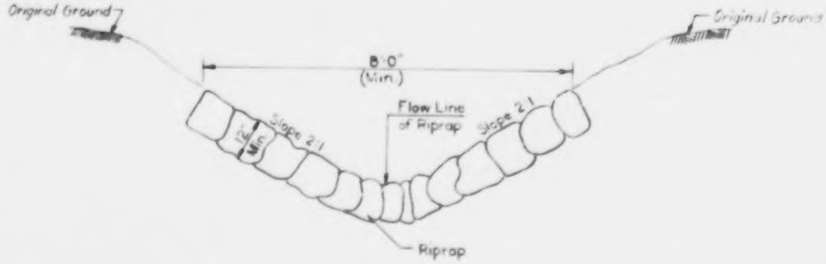
CHERRY CREEK WATERSHED
MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

PROJECT NO. F1-731
DATE MAY 1975
SHEET 38 OF 39

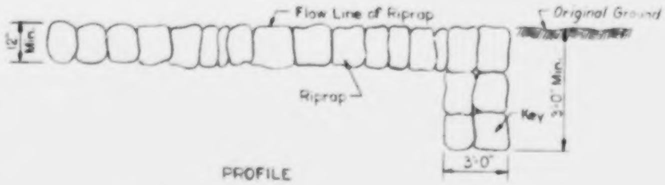

℄
Proposed Diversion Ditch
Original Ground
Slope 2:1
Original Ground
Existing Highwall
Place Ditch Excavated Material
Slope 2:1
2.0' Min.
Slope 2:1

DIVERSION DITCH DETAIL

No Scale


Original Ground
Original Ground
8'-0"
(Min.)
Flow Line of Riprap
12" Min.
Slope 2:1
Slope 2:1
Riprap

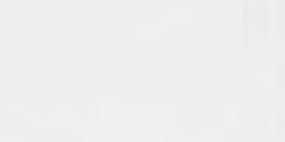
SECTION


12" Min.
Flow Line of Riprap
Original Ground
Riprap
Key
3'-0" Min.
3'-0"

PROFILE

DUMPED RIPRAP DETAIL

No Scale


Proposed Grade Li
Slope 2:1

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SKELLY & LOY
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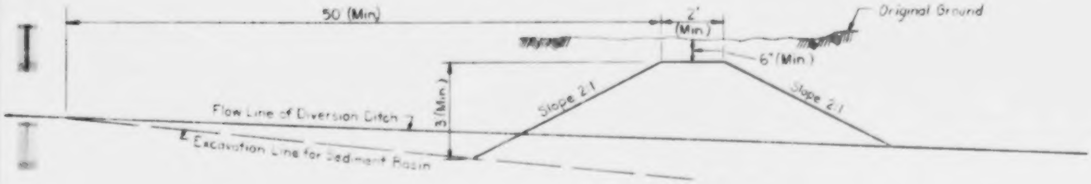
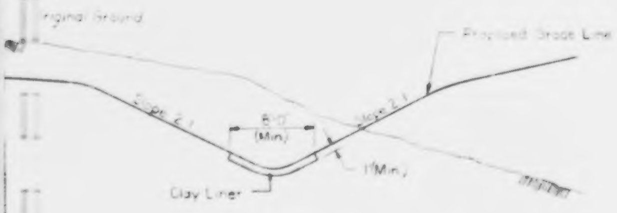
HARRISBURG, PENNSYLVANIA



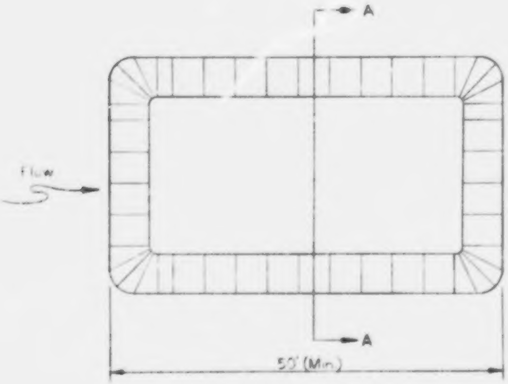
50 (Min)
2' (Min)
Original Ground
6" (Min)
3' (Min)
Slope 2:1
Slope 2:1
Flow Line of Diversion Ditch
Excavation Line for Sediment Basin

DETAIL SEDIMENT CONTROL DIKE
No Scale



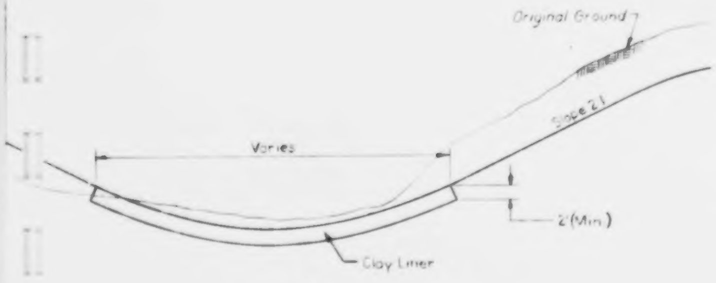
Original Ground
Proposed Grade Line
Slope 2:1
Slope 2:1
8'-0" (Min)
1' (Min)
Clay Liner

SECTION E-E
(See Sheet Nº 3)



A
A
Flow
50' (Min)

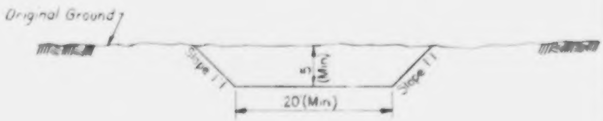
PLAN



Original Ground
Slope 2:1
Varies
2' (Min)
Clay Liner

SECTION G-G
(See Sheet Nº 3)

DETAIL-CLAY SWALE LINER
10 0 10 20
Scale in Feet



Original Ground
Slope 1:1
5' (Min)
Slope 1:1
20' (Min)

SECTION A-A

DETAIL-SEDIMENT CONTROL BASIN
10 0 10 20
Scale in Feet

APPROVED

NO.	DATE	REVISIONS

DETAILS

CHERRY CREEK WATERSHED
MINE RECLAMATION & POLLUTION ABATEMENT
GARRETT COUNTY, MARYLAND

PROJECT NO. F1-731
FUNDS
DATE MAY 1973
DRAWING NO.
SHEET 39 OF 39

DIVISION I - GENERAL REQUIREMENTS

SECTION 01010

SUMMARY OF THE WORK

PART I - GENERAL

1.01 SCOPE OF WORK

A. Purpose of Contract:

The purpose of this Contract is to abate the acid pollution originating from six (6) strip mine areas and two (2) deep mines located in the Cherry Creek and Casselman River Watersheds. The following is a description of these areas:

1. Mine Number 805--24 acre partially regraded strip mine developed to the dip on the Lower Bakerstown coal seam.
2. Mine Number 808--20 acre terrace regraded strip mine developed to the dip on the Lower Bakerstown coal seam.
3. Mine Number 809—19 acre non-regraded strip mine developed to the dip on the Middle Kittanning coal seam.
4. Mine Number 810--12 acre non-regraded strip mine developed to the dip on the Upper Freeport coal seam.
5. Mine Number 217--24 acre non-regraded strip mine developed to the dip on the Upper Freeport coal seam.
6. Mine Number 218--8 acre non-regraded strip mine developed to the dip on the Brush Creek coal seam.
7. Mine Number 902--deep mine with separate slope entryways and a drainway developed to the rise on the Upper Freeport coal seam.
8. Mine Number 904--deep mine with four (4) adjacent slope entries developed to the dip on the Upper Freeport coal seam.

B. Methods of Abatement and General Sequence of Construction Operations

1. Strip Mines.

   a. Clearing and Grubbing.

   b. Construct surface water diversion ditches and sediment control structures.

   c. Treat water in any impoundments encountered to raise the pH value to between 6.0 and 9.0 and pump water to the nearest stream.

   d. Segregate and bury acidic materials when encountered.

   e. Regrade entire mine areas.

   f. Treat regraded areas with limestone.

   g. Fertilize and seed revegetated area.

2. Deep Mines.

   a. Clearing and Grubbing.

   b. Install monitoring wells and pipe for emergency draindown.

   c. Excavation for deep mine seals.

   d. Construct either concrete deep mine seals or clay plug, as shown on the Plans.

   e. Construct curtain grouting around concrete deep mine seals.

   f. Lime, fertilize and seed disturbed areas.

1.02 ITEMS OF WORK

A. Estimate of Quantities:

Inspector's Field Office and Inspection Facilities	– LUMP SUM
Mine Pump-Down Hole/Monitoring Well	– 50 L.F.

Monitoring Well	- 25 L.F.
Grout Drilling and Insertion	- 1700 L.F.
Clearing and Grubbing	- LUMP SUM
Grading	- 352,500 C.Y.
Excavation for Deep Mine Seals	- 8,000 C.Y.
Clay Plug	- 300 C.Y.
Removal and Burial of Bony Material	- 3,700 C.Y.
Concrete Endwall	- 1 Each
Diversion Ditch	- 2,580 C.Y.
Dumped Riprap	- 378 C.Y.
Dewatering Impoundments	- LUMP SUM
Clay Swale Liner	- 320 C.Y.
24" Corrugated Metal Pipe	- 16 L.F.
8" Plastic Pipe	- 200 L.F.
8" Plastic Gate Valve	- 1 Each
Manhole, Frame and Cover	- 1 Each
Revegetation	
Revegetation with Limestone Screenings	- 101 Acres
Revegetation with Ground Agricultural Limestone	- 1.5 Acres
Jute Matting	- 1460 S.Y.
Concrete Deep Mine Seal	- 135 C.Y.
Curtain Grouting	
Cement	- 175 Bags
Aggregate	- 50 Tons
Fly Ash	- 650 Bags
Sand	- 18 Tons
Admixtures	- 500 Lbs.

The accuracy of the estimated quantities listed above is not guaranteed by the State or the Professional. The State and/or the Professional will not be responsible in any way for the consequences caused by any errors or omissions in these estimated quantities.

PART 2 - EXECUTION

2.01 DEFECTIVE WORK

Neither the inspection nor supervision of the work, the presence or absence of any employee of the State during the execution of any part of the work shall relieve the Contractor of any of his obligations under the Contract or of conforming his work to the lines, grades and elevations given by the Engineer; not withstanding that such work and material may have been previously overlooked and accepted or estimated for payment. If the work or any part thereof shall be found defective or to have been damaged at any time before the final acceptance of the whole work the Contractor shall forthwith make good such defect, or injury in a manner satisfactory to the Engineer, without extra compensation therefore even though said defect or injury may not have been due to any act, default, or neglect on the Contractor's part.

2.02 REMOVAL OF CONDEMNED MATERIAL

If any material brought upon the ground or selected for use in the work shall be condemned by the Engineer as unsuitable or not in conformity with the Specifications, the Contractor shall forthwith remove it from the vicinity of the work without delay, and upon his failure to do so within 48 hours after the receipt of notice, the condemned materials may be removed by the Engineer and the cost of said removal shall be deducted from any monies due to become due the Contractor under the Contract.

2.03 INJURY TO PROPERTY

In case any direct or indirect damage is done to public or private property by or because of the work, or in consequence of any act or omission on the part of the Contractor, his employees or agents, the Contractor shall, at his own cost, restore such property to a condition similar or equal to that existing before such damage was done, by repairing, rebuilding, or otherwise restoring, as may be required by the Engineer, or shall make good such damage in a satisfactory manner; and in case of failure on the part of the Contractor to promptly so restore such property or make good such damage, the Engineer may, upon 48 hours written notice, proceed to repair, rebuild, or otherwise restore such property as may be necessary, and the cost thereof will be deducted from any monies due or to become due the Contractor under the Contract; or the Chief Administrative Officer may deduct from any monies due the Contractor a sum sufficient, in the judgment of the Engineer, to reimburse the owners of the property so damaged.

2.04 SUSPENSION OF WORK

The Chief Administrative Officer may suspend the whole or any part of the work under the Contract if in his judgment such action is necessary or advisable. Any claim for such damage shall be subject to the terms of the section hereof entitled "Claims for Damages". No allowance, however, will be made for minor interruptions to the work from whatever cause.

2.05 RIGHT OF RECOVERY

The Chief Administrative Officer shall not, nor shall any State employee be precluded or estopped under any provision of the Contract, from showing the true and correct amount and character of the work done and materials furnished by the Contractor, or any other person, under the Contract, at any time before or after the final completion and acceptance of the work and payment, or from showing at any time that any such payment is incorrect or improperly made in any particular, or that the work, or any part thereof, does not in fact conform to the Plans and Specifications; and the Chief Administrative Officer shall not be precluded or estopped, notwithstanding any such certificate and payment in accordance therewith, from demanding and recovering from the Contractor such damages as the State may sustain by reason of his failure to comply with the terms of the Contract.

2.06 CLAIMS FOR DAMAGE

A. If the Contractor shall claim compensation for any damage sustained by reason of the acts of the State or any official or agent thereof, he shall, within five (5) days after the sustaining of such damage, make a written statement to the Engineer stating the nature of the damage sustained, and shall on or before the fifth day of the month succeeding that in which he shall allege that such damage has been sustained, file with the Engineer an itemized statement of the details and amount of such damage. Unless such statement shall be made as thus required, his claim for compensation shall be forfeited and invalidated, and he shall not be entitled to payment on account of any such damage.

B. Whenever it shall appear to the Contractor that due to the exigencies of the work he is about to incur damage, owing to the neglect or refusal of the Engineer to issue an extra work order or to any other cause whatever, he shall at once notify the Engineer or his representative in writing of such fact and state the nature of his possible claim in order that the Engineer may obtain necessary and authentic information to guide future consideration and action on such claim; and unless the Contractor shall comply with this requirement his claim for damage shall be forfeited and invalidated. Such notification shall not take the place of, but shall be in addition to, the written statement hereinabove required to be submitted within five (5) days after the occurrence of an alleged cause for damage.

2.07 CONSTRUCTION STAKE-OUT

The Contractor shall provide all engineering and stake-out which may be required for the proper construction of the work in this Contract. The cost of this work shall be included in the prices bid for other items, and no additional compensation will be paid therefore by the State.

2.08 EXISTING UTILITIES

A. Should the Contractor in the course of his operations encounter any underground utilities, the presence of which was not previously known, he shall immediately notify the Engineer, and take all necessary precautions to protect the utilities and maintain continuance of service until said utilities can be relocated by the owners.

B. In case of any damage to utilities by the Contractor, either above or below ground, the Contractor shall restore such utilities to a condition equal to that which existed before the damage was done, by repairing, rebuilding, or otherwise restoring as may be directed, and at the Contractor's entire cost and expense.

SECTION 01200

PROGRESS AND PAYMENT

1.01 METHOD OF PAYMENT

All items of work in this Contract are to be paid for on a lump sum basis. The contract lump sum price shall include all materials, equipment, tools, labor, and work incident thereto.

Unit prices are included in the Special Form of Proposal specifically to provide a method of paying for changes (additions, deletions, etc.) in the Contract. When the use of unit prices is required, said unit prices shall include all materials, equipment, tools, labor, and work incident thereto.

1.02 SALES TAX

As of July 1, 1968, Bidders are required under Chapter 452, Laws of Maryland 1968, Senate Bill 209, to include State Tax as stated in Sec. 326, Sub. Section A.

Sales to the State of Maryland or any of its political sub-division:

Provided that this subsection shall not be construed or applied to exempt any sale, otherwise taxable under this subtitle, of tangible personal property to contractors or builders to be used for the construction, repair or alteration of real property, ON CONTRACTS ADVERTISED FOR BIDS AFTER THE EFFECTIVE DATE OF THIS ACT.

SECTION 01300

SUBMITTALS

1.01 CONSTRUCTION SCHEDULES

The Contractor shall submit a construction schedule outlining his method of accomplishing the prescribed work for each Pollution Source, to the Engineer for his approval before beginning work on said Pollution Source. The Contractor shall not begin work on any Pollution Source until the Engineer has approved his construction schedule for that Pollution Source.

1.02 PROGRESS REPORTS

The Contractor shall submit a progress report to both the Department of General Services and the Engineer monthly, no later than the 5th of the month, outlining what work he accomplished in the preceding month and what percentage of the total project is completed.

SECTION 01500

TEMPORARY FACITILITES AND CONTROLS

1.01 PRESERVATION AND RESTORATION OF PROPERTY, TREES, SIGNS, MARKERS, ETC.

A. The Contractor shall not enter upon private property for any purpose without obtaining permission and he shall be responsible for the preservation of all public and private property, trees, monuments, highway signs and markers, fences along and adjacent to the work, and shall use every precaution necessary to prevent damage or injury thereto. He shall take suitable precaution to prevent damage to underground or overhead public utility structures and shall protect carefully from disturbance or damages all land monuments and property marks until the Engineer has witnessed or otherwise referenced their location, shall not remove them until directed, and shall replace them as directed by the Engineer.

B. The Contractor shall be responsible for all damages or injury to property of any character during the prosecution of the work, resulting from any act, omission, neglect or misconduct in his manner or method of executing said work satisfactorily, or due to his nonexecution of said work, or at any time due to defective work or materials, and said responsibility shall not be released until the work shall be completed and accepted. When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct in the execution of the work or in consequence of the nonexecution thereof on the part of the Contractor, he shall restore, at his own expense, such property to a condition similar or equal to the condition existing before such damage or injury was done by repairing, rebuilding or otherwise restoring as may be directed by the State, or he shall make good such damage or injury in an acceptable manner. In case of the failure on the part of the Contractor to restore such property or make good such damage or injury, the Engineer may, upon 48 hours notice, proceed to repair, rebuild or otherwise restore such property as may be deemed necessary, and the cost thereof will be deducted from any monies due or which may become due the Contractor under his contract.

C. Special attention shall be given the landscape features of the work and special care taken to protect the natural surroundings. The Contractor shall not deface, injure or destroy trees or shrubs outside the defined area of work nor remove or cut them without special authority. The roots of such trees or shrubbery will not be cut unnecessarily, and the Contractor will be required to handwork or otherwise prevent damage to roots of trees, which extend into grading limits and/or from trees intended to be left in an undamaged state, within the construction limits. No road machinery of any description which might throw off gas or smoke in such volume as to damage vegetation shall be allowed to stand under such trees or shrubbery.

D. Selected trees, that, in the opinion of the Engineer, may be defaced, bruised, injured or otherwise damaged by the Contractor's construction equipment or operations shall be protected by boards or planks.

E. Any timber, trees or landscape features scarred or damaged by the Contractor's operations shall be removed, neatly trimmed up or restored as nearly as possible to the original condition, as required by the Engineer and at the Contractor's expense. All scars made on trees by construction operations or the removal of limbs shall be painted as soon as possible with an approved paint. No trees shall be used for anchorages, or in lieu of placing of dead men, unless specifically authorized by the Engineer, in which special emergency use the Contractor will first wrap the trunk with a sufficient thickness of burlap or rags, overwhich soft wood cleats shall be tied, before any wire, cable or rope is placed. The Contractor shall in any event be responsible for any damage to any tree so used and shall repair any such damage due to this use of the tree, if any occurs.

1.02 POLLUTION CONTROL

The Contractor shall make himself familiar with the sedimentation and erosion control devices called for on the Plans. He shall construct these devices where shown on the Plans and/or as directed by the Engineer.

The Contractor shall determine what, if any, local ordinances, codes, and regulations apply to his work. He shall comply with all such ordinances, codes, and regulations.

SECTION 01501

INSPECTOR'S FIELD OFFICE AND INSPECTION FACILITIES

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of providing, furnishing, and maintaining a field office for the exclusive use of the State's inspectors and engineers. The Contractor shall supply all materials and furnishings and after the period of usage has expired, the required buildings and equipment shall become the property of the Contractor.

1.02 GENERAL REQUIREMENTS

The Inspector's Field Office shall be an approved, heated, weatherproof building or trailer, situated as approved by the Engineer at a location on the project, separate from other offices and maintained for the life of the project.

1.03 METHOD OF PAYMENT

Payment for the Item of Inspector's Field Office and Inspection Facitilies shall be as specified in Section 01200 with the following additional provision:

The contract lump sum price for this item shall be payable to the Contractor in accordance with the following schedule:

Fifty (50) percent of the contract lump sum price will be paid when the Contractor has completed work representing ten (10) percent of the total contract price. The remaining fifty (50) percent of the contract lump sum price will be paid when the Contractor has completed work representing sixty (60) percent of the total contract price.

SECTION 01510

TEMPORARY WORK AND CONSTRUCTION

PART I - GENERAL

1.01 SCOPE OF WORK

A. The work under this Contract includes all necessary temporary items required in good safe construction practice and administration of the project. Any or all of the items may be required in conjunction with work of permanent nature described in any or all other sections of the Specifications.

B. All temporary work except as specifically stated shall be removed by the time of final acceptance of the project.

1.02 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Storage Sheds and Platforms

Waterproof shelter must be provided for the storage of cement and other materials subject to spoilage. Lumber must be stored off the ground and kept dry. Platforms must be provided for other materials likely to be damaged if improperly stored.

B. Transportation:

All materials shall be so protected during transport and handling to prevent any damage. This shall include the provision of any necessary lifting devices or machines, and the skilled personnel to operate such machines.

1.03 METHOD OF PAYMENT

No separate payment will be made for the Item of Temporary Work and Construction, but the cost therefor shall be included in the various other Items bid in the Contract.

PART 2 - EXECUTION

2.01 TEMPORARY FACILITIES

A. Inspector's Field Office and Inspection Facilities shall be as specified in Section 01501.

B. Temporary Privy :

The Contractor, if so directed by the Engineer, shall provide and maintain a suitable sanitary privy for the use of his workmen at a location designated by the Engineer. At the completion of the work it shall be removed and the premises left clean.

2.02 PROJECT SIGNS

A. The Contractor shall provide and erect project signs conforming to Department of General Services Specifications at such locations as directed by the Engineer.

B. The Contractor shall maintain the signs in good condition during construction and upon completion of construction he shall remove said signs from the project site.

C. No other signs shall be erected by the Contractor on the project site.

D. The cost for furnishing and erecting project signs shall be included in the base bid.

SECTION 01700

PROJECT CLOSEOUT

1.01 CLEANING-UP

The Contractor shall at all times keep the premises free from accumulation of waste materials and rubbish. Upon completion of the work he shall remove all rubbish, all his tools and equipment, formwork and surplus materials and shall leave the work and project site completely clean.

1.02 GUARANTEES

The Contractor shall guarantee all material, workmanship, and equipment against original defects or against injury from proper and usual wear, when used for the purpose intended, for one (1) year after final payment and shall maintain all items in perfect condition during this period.

1.03 FINAL INSPECTION

Upon completion of all work set forth in the Contract, and before final payment is made, a final inspection shall be conducted at which time all materials and workmanship will be examined for quality and completeness. If any work is found to be unsatisfactory and/or incomplete, the Contractor will be required to repair, complete or reconstruct, as directed by the Engineer, that work found to be unsatisfactory and/or incomplete, to the satisfaction of the Engineer, before final payment will be made.

DIVISION 2 - SITE WORK

SECTION 02011

MINE PUMP-DOWN HOLE/MONITORING WELL

PART I - GENERAL

1.01 SCOPE OF WORK

This work shall consist of the construction of a six (6) inch hole, complete with casing and cap and furnishing a temporary pump, or pumps, at Pollution Source Number 902 for the initial purpose of removing water from behind the

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area where deep mine seals are to be constructed and for the long-term purpose of monitoring water level and quality and providing an overflow for the mine pool. The Contractor shall also provide treatment necessary to neutralize the mine water pumped from the mine to a pH value of between 6.0 and 9.0 before releasing the water to the stream. All work shall be in accordance with the Plans and Specifications or as directed by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete Deep Mine Seal, Section 03361.

B. Diversion Ditch, Section 02502.

C. Dumped Riprap, Section 02503.

1.03 METHOD OF PAYMENT

Payment for the Item of Mine Pump-Down Hole/Monitoring Well shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Casing.

The casings made of steel shall have a minimum weight of 19.18 pounds per foot (with threads and couplings) and a minimum thickness of 0.280 inches. Casings other than steel shall be adaptable to both the stresses to which the pipe will be subjected during installation and to the corrosiveness of the water.

B. Cap.

The cap shall be of steel comparable to that of which the casing is constructed. If a casing other than steel is used, the cap shall be made of the same material as the casing.

PART 3 - EXECUTION

3.01 CONSTRUCTION PROCEDURE

A. Drilling

Mine Pump-Down Hole/Monitoring Well shall be drilled through whatever material encountered using an air-rotary drill rig capable of drilling a 6-inch diameter hole with cuttings removed by air. The hole shall be drilled with bits and stabilizers that will provide a full-diameter straight hole.

B. Installation of Casing and Cap

A casing shall be installed in the hole from the bottom of the coal seam to at least one (1) foot above the ground surface. The casing shall be left in place and shall be equipped with a screw-type cap as approved by the Engineer. The cap shall also have slots in the top to permit overflow from the mine and prohibit debris from entering the hole.

C. Pumping

The Contractor shall provide a pump, or pumps, of sufficient capability to pump down the water behind the area where the mine seals are to be constructed and keep the water at a level that will allow construction of the mine seals. The pump, or pumps, shall be removed upon completion of construction of the mine seals.

D. Permanent Marker or Monument

The Contractor shall establish a permanent marker or monument at the Mine Pump-Down Hole/Monitoring Well to aid in locating the hole. The permanent marker or monument shall be constructed of concrete and shall have a square cross-section six (6) inches on a side and shall be five (5) feet long. It shall be constructed so that it extends four (4) feet below ground surface and one (1) foot above ground surface.

SECTION 02012

MONITORING WELL

PART I - GENERAL

1.01 SCOPE OF WORK

This work shall consist of the construction of a six (6) inch hole complete with casing and cap at Pollution Source Number 904 for the purpose of monitoring water level and quality after completion of the clay plug, in accordance with the Plans and Specifications or as directed by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Clay Plug, Section 02203.

1.03 METHOD OF PAYMENT

Payment for the Item of Monitoring Well shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Casing :

The casings made of steel have a minimum weight of 19.18 pounds per foot (with threads and couplings) and a minimum thickness of 0.280 inches. Casings other than steel shall be adaptable to both the stresses to which the pipe will be subjected during installation and the corrosiveness of the water.

B. Cap :

The cap shall be of steel comparable to that of which the casing is constructed. If a casing other than steel is used, the cap shall be made of the same material as the casing.

PART 3 - EXECUTION

3.01 CONSTRUCTION PROCEDURE

A. Drilling.

Monitoring Well hole shall be drilled using an air-rotary drill rig capable of drilling a 6-inch diameter hole with cuttings removed by air. The hole shall be drilled with bits and stabilizers that will provide a full-diameter straight hole.

B. Installation of Casing and Cap

The casings shall be installed in the holes from the bottom of the coal seam to at least one (1) foot above the ground surface. The casing shall be left in place and shall be equipped with a screw-type cap as approved by the Engineer.

C. Permanent Marker or Monument

The Contractor shall establish a permanent marker or monument at the monitoring well to aid in locating the hole. The permanent marker or monument shall be constructed of concrete and shall have a square cross-section six (6) inches on a side and shall be five (5) feet long. It shall be constructed so that it extends four (4) feet below ground surface and one (1) foot above ground surface.

SECTION 02013

GROUT DRILLING AND INSERTION

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of the drilling of holes, through whatever type material encountered, at the locations and to the depths shown on the Plans, for the purpose of installing curtain grouting, casings in the drill holes, grout packers, the actual insertion of grout under pressure into the strata adjacent to the concrete deep mine seals, and the testing of the pressure in the holes during grouting operations in accordance with these Specifications and as directed by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete Deep Mine Seal, Section 03361

B. Curtain Grouting, Section 03362

1.03 METHOD OF PAYMENT

Payment for the Item of Grout Drilling and Insertion shall be as specified in Section 01200.

PART 2 - EXECUTION

2.01 CONSTRUCTION PROCEDURE

A. Drilling:

Construction holes shall be spaced and drilled in the general alignment shown on the Plans or as directed by the Engineer. Air-rotary drill rigs shall be used capable of drilling 3-inch diameter holes with cuttings removed by air. The holes shall be drilled with bits and stabilizers that will provide full-diameter straight holes.

B. Casings:

Casings shall be installed in all drill holes from the top of the coal seam to at least one (1) foot above the surface of the ground. It shall be the responsibility of the Contractor to protect the casings and holes from damage and debris until construction is completed.

C. Curtain Installation:

1. General:

All openings encountered by the grout holes, in or above the mine or coal seam, shall be injected with grout materials using such materials, quantities, mixes, pressures, pumping rates and other procedures as will establish a grout curtain with the rock strata to the satisfaction of the Engineer.

2. Small Voids:

For small voids, insert the grout pipe and backfill the hole with a volume of cement grout (pre-determined by the Engineer) for ten (10) feet above the void. The grout supply pipe is then withdrawn allowing grout under gravity flow into the rock strata fractures. Repeat this operation if required.

3. Large Voids:

If large voids are encountered, inject coarse aggregate into the void and grout the aggregate as follows:

Insert to the bottom of the void a 1¼ inch or 1½ inch diameter closed-end steel pipe with perforations at 90° center to center, spaces at three (3) inches vertically along the bottom twelve (12) inches of the pipe. Grout the aggregate by raising the 1¼ inch or 1½ inch grout pipe in one (1) foot increments using a cement-fly ash grout.

D. Grouting Pressure

The pressure for grouting shall be in the range of 10 psi to 50 psi, using as a guide one-half pound per square inch per foot of depth measured from the ground surface to the packer.

E. Grout Packers

Grout packers shall be used to seal the drill hole at specific elevations and shall withstand, without leakage, water pressure equal to the maximum grout pressure for a period of five (5) minutes. Additional packers may be required in adjacent holes as directed by the Engineer.

F. Pressure Testing

Pressure testing shall be required, as directed by the Engineer, in any stage of the pressure grouting operations in any hole. In no case shall the testing pressure exceed the maximum grouting pressure as directed by the Engineer.

2.02 EQUIPMENT

A. Grout Plant

The grout plant shall consist of a platform of sufficient size to store and protect from the weather the necessary quantities of cement and fly ash.

The grout plant shall be equipped with double tank grout mixers capable of mixing at least ten (10) cubic feet per batch per tank.

The grout plant shall include all miscellaneous items such as pipe, hose, fittings, pressure gauges, control valves, packers, and tools that may be required to complete the grouting operation.

B. Water Meter

A water meter shall be installed on the water line to permit accurate measurements of the quantity of water used in making the various types of grout.

C. Pump

A pump shall be supplied having the necessary capacities to circulate the various grout mixtures through conductor hoses to the grout holes and to meet the requirements as stated in these specifications.

D. Power Equipment

A truck equipped with a small derrick, or a winch with a derrick, or a drilling machine similarly equipped, shall be used at the site to lower and raise the grout pipe. The truck, winch and derrick, or the drilling machine, shall also be equipped with the necessary devices to drive, if necessary, the grout pipe into a clogged hole.

SECTION 02020

SUBSURFACE INFORMATION

1.01 DESCRIPTION OF EXISTING INFORMATION

Test borings have been taken in the area of this Contract and the locations of the completed borings, as shown on the Plans, and the boring data are included as part of these Specifications for theContractor's information only.

The accuracy of these data cannot be guaranteed.

SECTION 02111

DISPOSAL OF ABANDONED ON-SITE MACHINERY

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of the disposal of all abandoned on-site machinery as shown on the Plans or as directed by the Engineer.

1.02 OPTIONS

The Contractor may exercise the following options with respect to the disposal of abandoned on-site machinery:

A. Dismantle machinery as may be required to bury it in the fill areas.

B. Dismantle machinery as may be required to remove it from the site, in which case it becomes his property and he may dispose of it as he chooses.

1.02 METHOD OF PAYMENT

No separate payment shall be made for the Item of Disposal of Abandoned On-Site Machinery, but the cost therefor shall be included in the lump sum price bid for the Item of Clearing and Grubbing.

PART 2 - EXECUTION

2.01 DEMOLITION OF ABANDONED ON-SITE MACHINERY

If the abandoned on-site machinery is to be disposed of on site, the demolition of such machinery shall be accomplished to the extent that it can be buried in the fill to the satisfaction of the Engineer.

2.02 DISPOSAL OF ABANDONED ON-SITE MACHINERY

If the abandoned on-site machinery is disposed of on site, it shall be buried in the fill along the highwall and shall be at least six (6) feet below the surface of the finished grading or as approved by the Engineer.

SECTION 02130

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of the removal of all objectionable material, rubbish, trees, stumps, brush, roots, down timber, and any other vegetation from within the limits of contract as defined by the Plans.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Preservation and Restoration of Property, Trees, Signs, Markers, etc. to remain, Section 01500, Article 1.01.

1.03 PROTECTION

Roads, adjacent property and other works to remain, shall be protected throughout the work.

1.04 METHOD OF PAYMENT

A. Payment for the Item of Clearing and Grubbing shall be as specified in Section 01200.

B. Clearing and/or grubbing done for Contractor's convenience will not be considered in payment for work under this Section.

1.05 REQUIREMENTS OF REGULATORY AGENCIES

State and local code requirements shall control the disposal of trees and shrubs.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Wound Paint

Wound paint shall be a standard bituminous product.

B. Explosives

Explosives shall be at the Contractor's option.

PART 3 - EXECUTION

3.01 CLEARING AND GRUBBING

A. Limits of Clearing

Limits of clearing shall be all areas within the limits of contract as defined by the Plans.

B. Trees, Saplings, Shrubs, and Bushes in Excess of 1½ inches in Diameter

Trees, saplings, shrubs and bushes in excess of 1½ inches in diameter measured twelve (12) inches above the ground, shall be cut down or uprooted at the Contractor's discretion. Such trees, saplings, shrubs and bushes shall be burned, removed from the site, or otherwise disposed of as approved by the Engineer.

C. Trees, Saplings, Shrubs and Bushes Less Than 1½ Inches in Diameter

Trees, saplings, shrubs and bushes less than 1½ inches in diameter measured twelve (12) inches above the ground, as well as all brush and undergrowth, may be buried in the fill as encountered in the work of moving spoil. If the Engineer finds the concentration of material to be buried excessive, he may require the Contractor to either remove or spread such excessive amounts.

D. Stumps of Trees, Saplings, Shrubs and Bushes in Excess of 1½ Inches in Diameter

Stumps of trees, saplings, shrubs and bushes in excess of 1½ inches in diameter measured twelve (12) inches above the ground located in the pit area, or any area to be filled, which are not uprooted may be left in place.

E. Buried Trees Encountered in the Spoil

If buried trees are encountered in the spoil, it shall be the Contractor's responsibility to remove and dispose of them. Removal and disposal of such buried trees is understood to be included in the bid price and shall not be a basis for claim by the Contractor for additional compensation.

3.02 DISPOSAL OF SALVAGEABLE MATERIAL

A. Burning

1. Material resulting from clearing and grubbing operations that is to be burned shall be burned on site, in strict conformance with applicable state and local laws and ordinances, at such locations as directed by the Engineer.

2. Material to be burned shall be burned as the work progresses in accordance with a schedule approved by the Engineer.

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3. Burning shall be conducted only under the care and supervision of a competent watchman and at such times and in such manner that anything designated to remain on the property, the surrounding trees and shrubs or other adjacent property will not be jeopardized. Unguarded fires will not be permitted.

4. Burning shall be in accordance with the following restrictions:

   a. Burning of poison oak, poison ivy or other plants of similar nature shall be prohibited.

   b. Tires or other combustible waste material shall not be used to augment burning.

5. Noncombustible material and ashes shall be buried on the site in the fill areas as directed by the Engineer.

B. Removal

1. Material resulting from clearing and grubbing operations that is to be removed from the site shall be removed daily as it accumulates.

SECTION 02201

GRADING

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of all earthwork and related and incidental operations necessary to cause the finished graded surface to be in close conformity with the dimensions and elevations shown on the Plans and Cross Sections.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation for Deep Mine Seals, Section 02202.

B. Removal and Burial of Bony Material, Section 02204.

C. Dewatering Impoundments, Section 02503.

1.03 DEFINITIONS

A. Spoil Material

Spoil material is material that has been disturbed as a result of the mining operation, but is neither coal nor topsoil. It can be composed of overburden, acid-forming material, bony material, rock, etc. or any combination of the same.

B. Acid-Forming Material:

Acid-forming material is generally a dark gray or black material found in the spoil.

C. Bony Material:

Bony material is finely ground black silty material composed mostly of shales and low-grade coals.

1.04 SPECIAL REQUIREMENTS

A. The Contractor shall obtain permits and/or approvals from the appropriate County or State agency for any off-site work which includes off-site borrow pits, waste areas and treatment of these during and after completion of the grading. A copy of the permits and/or approvals must be furnished to the Engineer prior to starting the work covered by the said permits and/or approvals.

B. No spoil shall be wasted in Cherry Creek or adjacent bank areas. Buffer strips should be used wherever possible to protect Cherry Creek.

C. Equipment crossings in Cherry Creek shall be constructed of a permeable nature such as ungrouted riprap placed over Filter X or similar materials. Obstructions shall not be left in Cherry Creek beyond the period of project construction.

1.05 METHOD OF PAYMENT

A. Payment for the Item of Grading shall be as specified in Section 01200.

B. Excavation required in grading operations and in the construction of sedimentation and erosion control devices will not be paid for separately, but the cost therefor shall be included in the cost of the Item of Grading.

PART 2 - EXECUTION

2.01 PREPARATION

Existing depressions in fill areas such as gullies, old stream channels, stump holes, etc., shall be backfilled to the adjacent ground elevation and compacted prior to placing the initial layer of fill.

2.02 CONSTRUCTION PROCEDURE

A. General Requirements

1. The Contractor shall utilize the material from work area that is best suited as surface material, as approved by the Engineer.

2. The Contractor shall grade in a manner to prevent impoundments from forming during construction.

3. Swales and ditches shall be graded to flow as indicated on the Plans.

4. Settlement or washing that occurs in graded or backfilled areas shall be repaired to specified contours.

5. All excavation required in the grading operations shall be considered unclassified and all material encountered, regardless of type or hardness, shall be removed to required lines and depths.

B. Rough Grading

1. All earth for fill shall be provided from spoil piles and excavation within the limits of contract as defined on the Plans.

   The material shall be spread in uniform horizontal layers of not more than a loose twelve (12) inch depth. Each layer shall be thoroughly compacted by making the maximum practical use of available hauling and spreading equipment or other suitable, approved means. The Contractor shall use particular care during compaction to insure a firm and well compacted surface, as approved by the Engineer, in the areas where jute matting is to be placed.

2. Any bony material, acid-forming material, or other dark material encountered that is not concentrated or easily separated from the spoil material shall be spread evenly in fill areas and covered with a minimum of five (5) feet of clean spoil or as approved by the

Engineer. The determination as to whether a material is acid-forming or not will be made in the field by the Engineer.

C. Finished Grading

Upon completion of the rough grading the Contractor shall spread the surface material evenly over the graded area to the approximate limits and contours shown on the Plans. The surface area shall be kept free from stones or debris which would be detrimental to revegetation.

D. Utility Poles

Utility poles located within the area to be graded shall remain undisturbed. In areas of fill, the finished grade shall be at least eighteen (18) feet below the power lines at all points.

SECTION 02202

EXCAVATION FOR DEEP MINE SEALS

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of excavation as may be required to uncover mine entries and open them up to allow mine seals to be constructed.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Grading, Section 02201.

1.03 METHOD OF PAYMENT

Payment for the Item of Excavation for Deep Mine Seals shall be as specified in Section 01200.

PART 2 - EXECUTION

2.01 CONSTRUCTION PROCEDURE

A. Excavation shall be performed at locations as directed by the Engineer. The extent of the excavation will depend upon information obtained and will be determined by the Engineer.

B. All excavation required under this Contract shall be considered unclassified; that is, the price bid shall be taken to include and cover all materials required to be excavated, whether wet or dry, and regardless of the character of the materials. No separate payment will be made for rock encountered.

C. Any topsoil encountered during excavation operations shall be placed on stockpiles on the site as directed by the Engineer.

D. Upon completion of backfilling operations, the Contractor shall spread the stockpiled topsoil evenly over the graded area as directed by the Engineer.

SECTION 02203

CLAY PLUG

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of furnishing, placing and compacting impervious material required to construct a clay plug for the purpose of inundating the designated mine (Pollution Source Number 904) and intercepting and eliminating flow from the existing drainway in accordance with these Specifications and within reasonably close conformity to the details as shown on the Plans.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Monitoring Well, Section 02012.

B. Excavation for Deep Mine Seals, Section 02202.

1.03 METHOD OF PAYMENT

Payment for the Item of Clay Plug shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Description of Material:

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The material to be used for the construction of the impervious plugs shall consist of more than 50% clay as defined by any nationally recognized Textural Classification Specifications, such as U. S. Department of Agriculture, American Association of State Highway Officials, U.S. Army Corps of Engineers, Civil Aeronautics Administration or U.S. Bureau of Public Roads. The upper limit of the particle size used to define the clay is 0.005 mm.

The clay shall have a liquid limit greater than 50, with medium to high plasticity, and practically impervious drainage characteristics. The impervious material to be used on the project must be approved by the Engineer prior to placing.

B. Availability of Material:

Sufficient clay may be available within the project area at the bottom of the existing depressions. If such is not the case, the Contractor is responsible for securing sufficient clay from a location outside the project site and transporting it to the job site. The Contractor will make his own estimate of the clay available at the job site prior to submitting his bid.

PART 3 - EXECUTION

3.01 CONSTRUCTION PROCEDURE

A. The Contractor shall perform whatever excavation is necessary to intercept the existing drainway that drains the designated mine (Pollution Source Number 904).

B. The clay shall be spread and compacted in twelve (12) inch layers to the dimensions and elevations shown on the Plans.

C. Each layer placed shall be thoroughly compacted by making the maximum practical use of the available hauling and spreading equipment, or some other suitable, approved means.

D. The limit of the plug shall extend a minimum of twenty-five (25) feet on either side of the deep mine opening and shall extend below the mine floor far enough to intercept the existing drainway and eliminate flow from it.

SECTION 02204

REMOVAL AND BURIAL OF BONY MATERIAL

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of the excavation and hauling of all concentrated bony or acid-forming material from on-site areas where it is encountered, burying it in fill areas, and covering it with clean spoil in accordance with these Specifications and as shown on the Plans.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Grading, Section 02201.

1.03 DEFINITIONS

See Definitions, Section 02201.

1.04 METHOD OF PAYMENT

Payment for the Item of Removal and Burial of Bony Material shall be as specified in Section 01200.

PART 2 - EXECUTION

2.01 PREPARATION

A. The determination as to whether a material is acid-forming or not will be made in the field by the Engineer.

2.02 CONSTRUCTION PROCEDURE

A. The concentrated bony and acid-forming material shall be spread to the dimensions and elevations shown on the Plans. The material shall be placed in uniform layers of not more than a loose twelve (12) inch depth. Each layer shall be thoroughly compacted by making the maximum practical use of available hauling and spreading equipment, or by other methods as approved by the Engineer.

B. Clean spoil shall be placed on top of the compacted bony or acid-forming material to the dimensions and elevations shown on the Plans and Cross Sections.

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SECTION 02501

CONCRETE ENDWALL

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of constructing a concrete endwall at the location and to the dimensions and elevations shown on the Plans and as directed by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. 8" Plastic Pipe, Section 02507.

1.03 QUALITY ASSURANCE

Testing and strength requirements for all materials shall be in accordance with the State Roads Commission Specifications for Materials, Highways, Bridges and Incidental Structures.

1.04 METHOD OF PAYMENT

Payment for the Item of Concrete Endwall shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete:

Concrete for concrete endwall shall be Class P-1 air-entrained as specified in the State Roads Commission Specifications for Materials, Highways, Bridges and Incidental Structures.

B. Reinforcement:

Reinforcement for concrete endwall shall be bar reinforcement as specified in the State Roads Commission Specifications for Materials, Highways, Bridges and Incidental Structures.

PART 3 - EXECUTION

3.01 PREPARATION

All surfaces of foundations upon which or against which the concrete is to be placed shall be free of standing or running water, frost, ice, mud, loose earth or rock, and debris of any kind.

3.02 CONSTRUCTION PROCEDURE

A. The bed of the endwall shall be excavated to the required depth and contour. All unsuitable material below the bottom of the endwall shall be removed and replaced with approved material. The entire foundation for the endwall shall be thoroughly compacted and finished to a firm and even surface.

B. The Contractor shall perform all forming and finish work necessary to produce a smooth and even surface.

C. All portions of the endwall under construction shall be protected from the elements, flowing water, or other disturbance until curing is completed.

SECTION 02502

DIVERSION DITCH

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of the construction of drainage ditches for the purpose of intercepting and diverting surface runoff water away from graded areas in accordance with these Specifications and as shown on the Plans.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Grading, Section 02201.

B. Excavation for Deep Mine Seals, Section 02202.

C. Dumped Riprap, Section 02503.

D. Revegetation, Section 02801.

E. Jute Matting, Section 02802.

1.03 METHOD OF PAYMENT

Payment for the Item of Diversion Ditch shall be as specified in Section 01200.

PART 2 - EXECUTION

2.01 CONSTRUCTION PROCEDURE

A. Diversion ditches shall be constructed at the locations and to the dimensions and elevations shown on the Plans and as directed by the Engineer.

B. Material from the ditch excavation shall be graded on the downhill side of the ditch as shown on the detailed drawings.

C. Diversion ditches shall be seeded and mulched as specified in Section 02801, Revegetation.

D. Diversion ditches shall have jute matting, as specified in Section 02802, Jute Matting, placed at the location shown on the Plans and as directed by the Engineer.

E. Diversion ditches shall have riprap as specified in Section 02503, Dumped Riprap, placed at the locations shown on the Plans and as directed by the Engineer.

SECTION 02503

DUMPED RIPRAP

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of preparing the foundation and placing riprap at the locations and to the dimensions and elevations shown on the Plans as directed by the Engineer.

1.02 METHOD OF PAYMENT

Payment for the Item of Dumped Riprap shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Stone for Riprap:

Riprap shall consist of sound durable rock, insoluble in water and of such quality as, in the opinion of the Engineer, is sufficient to insure long time durability. Friable, stratified rocks such as claystones, shall not be approved. Sources of riprap shall be subject to approval by the Engineer.

Stone for riprap shall be block shaped. The material shall be free of objectionable amounts of earth, quarry dust, or other foreign material. The mass shall be reasonably well graded, and will comply with the following gradation by weight requirements:

Nominal Thickness - 12 inches
20% of Stone - between 0 and 27 pounds.
Average Stone - between 70 and 120 pounds.
25% of Stone - between 140 and 250 pounds.
Maximum Stone - 350 pounds.

Unless otherwise specified, the determination of weights will be made by visual inspection.

PART 3 - EXECUTION

3.01 PREPARATION

Areas on which riprap is to be placed shall be trimmed and dressed to conform to approximate cross section shown on the Plans.

3.02 CONSTRUCTION PROCEDURE

A. Stone for riprap shall be placed to its full course thickness at one (1) operation and in such manner as to avoid displacing the underlying material. Placing riprap in layers will not be permitted. Riprap shall be spread to produce a reasonably well-graded mass of rock with the minimum practicable percentage of voids.

B. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Hand placing to a limited extent may be required but only to the extent necessary to secure the results specified above.

C. The riprap shall have a minimum thickness of one (1) foot. The finished surface of the riprap shall be in accordance with the lines and grades shown on the Plans. Keys shall be placed as shown on the Plans. The Contractor shall maintain the riprap until accepted, and any material displaced through the fault or negligence of the Contractor shall be replaced at his expense. Passage of equipment over the finished surface will not be allowed without specific approval of the Engineer.

SECTION 02504

DEWATERING IMPOUNDMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of treating the water in any impoundments encountered within the limits of contract for the purpose of neutralizing the water, and the removal of said treated water from the impoundments in accordance with these Specifications and as shown on the Plans, prior to grading operations.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Grading, Section 02201.

B. Revegetation, Section 02801.

1.03 METHOD OF PAYMENT

Payment for the Item of Dewatering Impoundments shall be as specified in Section 01200.

PART 2 - EXECUTION

2.01 CONSTRUCTION PROCEDURE

A. Impounded water shall be drained by pumping or by grading a channel in the natural direction of flow.

B. All discharges from dewatering operations shall be directed to existing stream channels adjacent to, and downstream from, the impoundments.

C. Ditches constructed for dewatering purposes shall be backfilled, compacted and revegetated upon completion of dewatering operations.

D. Rate of Discharge:

Water from impoundments shall be discharged at a slow, controlled rate to prevent erosion and large-scale stream siltation. The rate of discharge shall be approved by the Engineer.

SECTION 02505

CLAY SWALE LINER

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of furnishing and placing a clay liner on a proposed drainage swale, where shown on the Plans (Pollution Source Number 217), for the purpose of draining water from the existing spring across a regraded area. All work shall be done in accordance with these Plans and Specifications and as directed by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Grading, Section 02201.

1.03 METHOD OF PAYMENT

Payment for the Item of Clay Swale Liner shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

Description of Material and Availability of Material shall be as specified under Section 02203, Clay Plug.

PART 3 - EXECUTION

3.01 PREPARATION

The swale that is to receive the clay liner shall be graded to the lines and dimensions shown on the Plans or as directed by the Engineer prior to placing the clay liner.

3.02 CONSTRUCTION PROCEDURE

A. The clay shall be spread and compacted in a twelve (12) inch layer to the dimensions and elevations shown on the Plans.

B. The clay layer shall be thoroughly compacted by making the maximum practical use of the available hauling and spreading equipment, or some other suitable, approved means.

SECTION 02506

24" CORRUGATED METAL PIPE

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of furnishing and installing a 24" corrugated metal drainage pipe, including any excavation required for installation, at the location and to the dimensions and elevations shown on the Plans or as directed by the Engineer for the purpose of carrying water collected in a diversion ditch under a service road.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Diversion Ditch, Section 02502.

1.03 METHOD OF PAYMENT

Payment for the Items of 24" Corrugated Metal Pipe shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

Corrugated Metal Pipe shall conform to AASHO Designation: M 36.

PART 3 - EXECUTION

3.01 CONSTRUCTION PROCEDURE

Installation of corrugated metal pipe shall conform to the requirements stated in Section 34.02-3, Construction Methods, of the State Roads Commission Specifications for Materials, Highways, Bridges and Incidental Structures.

SECTION 02507

8" PLASTIC PIPE

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of furnishing and installing 8" plastic pipe, complete with shear collars, through concrete deep mine seal, as shown on the Plans, to provide a means of releasing the water retained in the mine by the mine seals. All materials and work performed shall be in accordance with these Plans Specifications and as directed by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. 8" Plastic Gate Valve, Section 02508.

B. Manhole, Frame and Cover, Section 02509.

C. Concrete Deep Mine Seal, Section 03361.

1.03 METHOD OF PAYMENT

Payment for the Item of 8" Plastic Pipe shall be as specified in Section 01200.

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PART 2 - PRODUCTS

2.01 MATERIALS

A. Plastic Pipe:

Plastic pipe shall be Polyvinyl Chloride (PVC) Schedule 80, Type I, Grade I, conforming to the requirements of ASTM-D-1784.

B. Shear Collars:

Shear collars shall be Polyvinyl Chloride (PVC) conforming to the requirements of ASTM-D-1784.

PART 3 - EXECUTION

3.01 CONSTRUCTION PROCEDURE

A. A section of plastic pipe shall be cast in the concrete deep mine seal complete with shear collar at the location shown on the Plans or as directed by the Engineer.

B. All joining of the plastic pipe shall be done by the "socket coupling" method.

C. The pipe shall also have shear collars installed on the pipe at ten (10) feet on centers. The material shall be a minimum of ½" PVC material properly fastened to the pipe in accordance with factory recommendations. The outside dimension of the collar shall be two (2) feet square.

D. The pipe shall be similar in all respects to that manufactured or supplied by the Plastic Piping Systems, Inc., Newark, New Jersey, and shall be installed in accordance with manufacturer's recommendations.

E. Filling Over Pipe:

The pipe trench backfill shall be placed and tamped in three (3) inch layers by hand from the bottom of the trench to the centerline of the pipe. The backfill material shall be sand or gravel through the earth embankment, as approved by the Engineer. From the centerline of the pipe to two (2) feet above the pipe, the backfill shall be placed and tamped in six (6) inch layers. The material shall contain no stones larger than one (1) inch. Backfilling above the 2 foot level shall then be done in accordance with procedures described elsewhere in these Specifications. The Contractor will, however, be responsible for the proper protection and safety of the installed pipe.

SECTION 02508

8" PLASTIC GATE VALVE

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of furnishing and installing an 8" plastic gate valve, as shown on the Plans, on the plastic pipe line as a means of regulating the flow of water retained in the mine by the deep mine seals. All materials and work performed shall be in accordance with these Plans and Specifications and as directed by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. 8" Plastic Pipe, Section 02507.

B. Manhole, Frame and Cover, Section 02509.

1.03 METHOD OF PAYMENT

Payment for the Item of 8" Plastic Gate Valve shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

Plastic gate valve shall be Polyvinyl Chloride (PVC) and shall conform to the requirements of ASTM-D-1784.

PART 3 - EXECUTION

3.01 CONSTRUCTION PROCEDURE

Plastic gate valve shall be installed on plastic pipe in manhole constructed as a valve pit at location shown on the Plans or as directed by the Engineer.

SECTION 02509

MANHOLE, FRAME AND COVER

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of furnishing and installing a standard pre-cast concrete manhole, to the dimensions and elevations shown on the Plans, to act basically as a valve pit for a plastic gate valve which controls release of water retained by the deep mine seals. All materials and work performed shall be in accordance with these Specifications and as directed by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. 8" Plastic Pipe, Section 02507.

B. 8" Plastic Gate Valve, Section 02508.

1.03 METHOD OF PAYMENT

Payment for the Item of Manhole, Frame and Cover shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Manhole:

The pre-cast manhole shall consist of a standard base, Type C, and a standard eccentric cone, Type 1, as manufactured by the United States Concrete Pipe Company, or approved equal.

B. Frame and Cover:

The manhole frame and cover shall be similar to those made by Neenah Foundry Company, or approved equal and shall be contructed in such a manner that the cover can be bolted to the frame.

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PART 3 - EXECUTION

3.01 CONSTRUCTION PROCEDURE

A. The ground on which the pre-cast manhole is to be placed shall be excavated to the required depth and contour as shown on the Plans. All unsuitable material below the bottom of the manhole shall be removed and replaced with approved material to the proper elevation. The entire foundation for the pre-cast manhole shall be thoroughly compacted and finished to a firm and even surface.

SECTION 02801

REVEGETATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of spreading limestone screenings over the graded areas, treating the soil with soil supplements, seeding and mulching within the limits shown on the Plans in accordance with these Specifications and as directed by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Grading, Section 02201.

B. Diversion Ditch, Section 02502.

1.03 METHOD OF PAYMENT

The Item of Revegetation shall be paid for either as Revegetation with Limestone Screenings or Revegetation with Ground Agricultural Limestone as may be required by these Specifications and payment for both shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Limestone Screenings

Limestone Screenings shall meet the following requirements:

Calcium Carbonate	90% Min.
Magnesium Content	2% Max.

S.R.C. No. CR-6 Gradation shall govern.

B. Soil Supplements:

Soil Supplements shall meet the following requirements:

Nitrogen	60 lbs/acre
Phosphorus	44 lbs/acre
Potash	20 lbs/acre

Rates of application may be amended by the Engineer following a field soil test of the final graded surface.

C. Seeding Mixture:

Seeding shall meet the following requirements:

Weeping lovegrass	10 lbs/acre
Birdsfoot trefoil	8 lbs/acre
Autumn olive	3 lbs/acre
Black locust	2 lbs/acre

Legume seed (Birdsfoot trefoil, Autumn olive and Black locust) shall be innoculated and trefoil shall be scarified.

All seed used shall be certified and labeled in accordance with U. S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of invitation for bids.

D. Mulch:

Mulch shall meet the requirements of Article 20.29, Mulch, of the State Roads Commission Specifications for Materials, Highways, Bridges and Incidental Structures.

PART 3 - EXECUTION

3.01 PREPARATION

Prior to treating the soil with limestone screenings, soil supplements and seed mixture the areas within the limits of revegetation shall be graded to the dimensions and elevations shown on the Plans and Cross Sections.

3.02 CONSTRUCTION PROCEDURE

A. Rates of Application:

1. Limestone screenings shall be applied at the rate of two hundred (200) tons per acre.

2. Ground agricultural limestone shall be applied to Pollution Source Numbers 902 and 904 at the rate of four (4) tons per acre in place of limestone screenings.

B. Limestone screenings shall be worked into the top six (6) inches of soil by roto-tilling or other approved means.

C. Seeding shall be in accordance with standard practice and the Contractor shall be responsible for proper maintenance.

D. Shrub and tree species shall be sown using the direct seeding method.

E. All areas and spots which do not show a prompt catch of grass shall be reseeded. This operation shall be repeated as often as is necessary to establish complete coverage to the satisfaction of the Engineer.

F. It shall be the Contractor's responsibility to backfill and revegetate all rain-washed gullies until a satisfactory grass growth has been obtained.

G. Seeded areas shall be mulched at a rate of 1000 pounds per 1000 square yards.

H. The Contractor may select the seeding time but he is responsible for securing a stand of grass satisfactory to the Engineer.

SECTION 02802

JUTE MATTING

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of furnishing, placing and maintaining jute matting to the lines and dimensions shown on the Plans and in accordance with these Specifications.

1.02 METHOD OF PAYMENT

Payment for the Item of Jute Matting shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Jute Matting:

The jute matting shall consist of undyed jute yarn woven into a uniform open plain weave mesh with approximately 1 inch square openings, and weighing not less than 90 pounds per 100 square yards. It shall be furnished in rolls not less than 150 feet long and 48 inches in width.

B. Wire Staples:

Staples for anchoring the matting shall be made of No. 8 gage steel wire, bent U-shaped with a throat width of 1 of 2 inches, and with an effective driving depth of not less than six (6) inches.

PART 3 - EXECUTION

3.01 PREPARATION

The entire area on which jute matting is to be placed must be graded and revegetated.

3.02 CONSTRUCTION PROCEDURE

A. The jute matting shall be unrolled parallel to the direction of flow without stretching and be anchored as specified. The matting shall be spread evenly and smoothly and be in contact with the mulch at all points. The up-channel end of each roll shall be buried a minimum depth of six (6) inches in a vertical slot which shall be backfilled and tamped, and shall be overlapped twelve (12) inches by any up-channel sections.

B. Jute matting shall be placed where shown on the Plans and at a minimum width of eight (8) feet or as directed by the Engineer.

C. If two (2) or more widths of matting are placed side by side, the upper mat shall overlap the lower by not less than four (4) inches, and shall be stapled along the overlap at 3-foot intervals. The unlapped edge shall be stapled at 6-foot intervals.

3.03 MAINTENANCE OF COMPLETED WORK

The Contractor shall be responsible for the proper maintenance of all jute matting to the satisfaction of the Engineer until the entire project has been accepted.

SECTION 03361

CONCRETE DEEP MINE SEAL

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of the construction of concrete deep mine seals, including wood barriers, all necessary shoring, and all excavation required to shape the mine entrance, in accordance with these Specifications and within reasonably close conformity to the details as shown on the Plans.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Mine Pump-Down Hole/Monitoring Well, Section 02011.

B. Grout Drilling and Insertion, Section 02013.

C. Excavation for Deep Mine Seals, Section 02202.

D. Curtain Grouting, Section 03362.

1.03 METHOD OF PAYMENT

Payment for the Item of Concrete Deep Mine Seal shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement shall be one of the following expansive types or approved equal:

1. "ChemStress" as manufactured by Kaiser Cement (this product is preferred if commercially available).

2. "ChemComp" as manufactured by Kaiser Cement.

3. Atlas M-X expansive cement.

B. Aggregate (Sand) shall conform to ASTM Designation C33 except for grading. The aggregate shall have a fineness modulus between 2.70 and 3.30. Grading shall be as follows:

Sieve Size	% Passing Min.	% Passing Max.
3/8 inch	100	
No. 4	95	100
8	65	90
16	45	75
30	30	50
50	10	22
100	2	8

C. Water shall be of potable quality.

D. Reinforcing is not required.

2.02 MIXES

The mixes shall consist of one (1) part cement, four (4) parts aggregate (sand) and no more water than is required to maintain satisfactory control over rebound and to obtain proper hydration of the cement.

PART 3 - EXECUTION

3.01 PREPARATION

Portions of the mine floor, walls and ceiling shall be removed to bring them to the lines on the Plans. Care shall be taken to remove any unsound material or laitance from the walls and ceiling before placement of the concrete. All muck shall be removed from the floor just prior to application of the concrete so that application at the floor level is on sound virgin material. Appropriate measures shall be taken to maintain the floor in a dry condition during the entire operation.

A wood barrier and standard roof shoring for mine safety shall be installed as a backing to begin the placement of the concrete seals.

3.02 CONSTRUCTION PROCEDURE

A. Method of Placing Concrete Deep Mine Seals:

The concrete seals shall be placed to the lines shown on the Plans by means of a pneumatic gun. The process used shall be the same as that normally referred to as "Gunite" or "Shotcrete".

B. Application

Placement of the gunite shall be accomplished only by experienced workmen in accordance with the standards of the trade. Material shall be placed in successive layers until the final form is accomplished. Care shall be taken to avoid excessive sag or the placement of slugs of excessively wet or dry material. Particular care shall be taken to insure the placement of solid dense material at all interfaces and corners between the concrete and the floor, walls and ceiling. Particular care shall be taken to remove excess rebound material from the floor before final application of gunite is made on same. This care is critical to prevent a zone through which mine water could bypass the seal.

3.03 EQUIPMENT

The Contractor shall supply all equipment necessary to perform the work of constructing a concrete deep mine seal. Any equipment recognized by the Gunite Contractors Association for the application of Gunite may be used. Operation of the equipment shall be in conformance with the manufacturer's recommendations.

SECTION 03362

CURTAIN GROUTING

PART 1 - GENERAL

1.01 SCOPE OF WORK

This work shall consist of furnishing the materials, and labor necessary to produce grouting material to be used in the construction of curtain grouting in accordance with these Specifications and as directed by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Grout Drilling and Insertion, Section 02013.

B. Concrete Deep Mine Seal, Section 03361.

1.03 METHOD OF PAYMENT

There shall be no payment for the curtain grouting operation, but payment shall be made for the various items comprising the curtain grouting operation as follows:

A. Cement:

Payment for the Item of Cement shall be as specified in Section 01200.

B. Aggregate:

Payment for the Item of Aggregate shall be as specified in Section 01200.

C. Fly Ash:

Payment for the Item of Fly Ash shall be as specified in Section 01200.

D. Sand:

Payment for the Item of Sand shall be as specified in Section 01200.

E. Water:

Payment will not be made for the Item of Water but the costs therefor will be included in the costs of the various other items bid in this Contract.

F. Admixtures:

Payment for the Item of Admixtures shall be as specified in Section 01200.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement:

Cement for grouting shall be normal strength Portland Cement Type II, conforming to ASTM Designation C 150. One bag of cement shall be 94 pounds net. A barrel of cement shall weigh 376 pounds and be equivalent to four (4) bags. Cement shall be shipped, stored and handled in a manner to prevent deterioration from moisture or other causes.

B. Aggregate:

Aggregate used for injection into large voids shall conform to the size and grading requirements of S.R.C. No. 6 coarse aggregate as specified in the State Roads Commission Specifications for Materials, Highways, Bridges and Incidental Structures.

C. Fly Ash:

Fly ash for grouting shall conform to ASTM Designation C 618. One bag of fly ash shall be 80 pounds net. Fly ash shall be shipped, stored, and handled in a manner to prevent deterioration from moisture or other causes.

D. Sand:

Sand for grouting shall be composed of hard, durable grains thoroughly cleaned by washing, free from harmful amounts of clay or silt, vegetation, or other substances determined to be deleterious. The sand shall meet the grading and quality requirements of S.R.C. No. 8 fine aggregate as specified in the State Roads Commission Specifications for Materials, Highways, Bridges and Incidental Structures.

E. Water:

Water for concrete shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

F. Admixtures:

Admixtures for grout shall be subject to approval by the Engineer.

2.02 MIXES

Grouts may be cement grout or mixes of the following materials, subject to approval of the Engineer: cement, fly ash, sand, water, and admixtures. A satisfactory mix, the one used to compute the quantities for this Contract, is one (1) part Cement, two (2) parts Sand and four (4) parts Fly Ash.

PART 3 - EXECUTION

3.01 CONSTRUCTION PROCEDURE

Installation of curtain grouting shall be accomplished by following the methods described in Section 02013, Grout Drilling and Insertion.

SPECIAL FORM OF PROPOSAL

Department of General Services
STATE OF MARYLAND
George R. Lewis, Secretary
301 West Preston Street
Baltimore, Maryland 21201

Date: ____________________

Job No.: F1-731

Gentlemen:

We hereby submit our proposal for the following:

STRIP MINE REGRADING, DEEP MINE SEALING, REVEGETATION AND MISCELLANEOUS WORK IN THE CHERRY CREEK WATERSHED, GARRETT COUNTY, MARYLAND.

Having carefully examined the "Instructions to Bidders", the "General Conditions", and the Specifications and Plans for the subject construction

Specifications numbered Division 1 - 1 through 12
Division 2 - 12 through 50

Drawings numbered 1 through 39

Addenda numbered ____________________

and having received clarification on all items of conflict or upon which any doubt arose, the undersigned proposes to furnish all labor, materials and equipment called for by the said documents for the entire work, in strict accordance with the Contract Documents, for the stipulated sum of;

BASE BID LUMP SUM: Price for the entire work complete in accordance with the plans and specifications: (Includes separate price items.)

____________________ Dollars ($ __________)
(Figures)

Sign for Identification ____________________

The State reserves the right to accept or reject any or all bids.

SCHEDULE OF UNIT PRICES

The following unit prices, if accepted in the award of the contract, shall be applied in computing the value of changes, additions, deletions, substitutions and cash allowance made in the work. Each unit price shall include all work, materials and incidentals necessary to complete the items except where noted.

NOTE: Prices shall be written in both words and numbers.

1. Inspector's Field Office and Inspection Facilities (per lump sum)

________________________________ Dollars ($ __________)
(written) (figures)

2. Mine Pump-Down Hole/Monitoring Well (per linear foot)

________________________________ Dollars ($ __________)
(written) (figures)

3. Monitoring Well (per linear foot)

________________________________ Dollars ($ __________)
(written) (figures)

4. Grout Drilling and Insertion (per linear foot)

________________________________ Dollars ($ __________)
(written) (figures)

5. Clearing and Grubbing, including disposal of abandoned on-site machinery (per lump sum)

________________________________ Dollars ($ __________)
(written) (figures)

6. Grading, including excavation required for grading and construction of sedimentation and erosion control devices (per cubic yard)

____________________ Dollars ($ ________)
(written) (figures)

7. Excavation for Deep Mine Seals (per cubic yard)

____________________ Dollars ($ ________)
(written) (figures)

8. Clay Plug (per cubic yard)

____________________ Dollars ($ ________)
(written) (figures)

9. Removal and Burial of Bony Material (per cubic yard)

____________________ Dollars ($ ________)
(written) (figures)

10. Concrete Endwall (per each)

____________________ Dollars ($ ________)
(written) (figures)

11. Diversion Ditch (per cubic yard)

____________________ Dollars ($ ________)
(written) (figures)

12. Dumped Riprap (per cubic yard)

____________________ Dollars ($ ________)
(written) (figures)

13. Dewatering Impoundments, includes treatment for neutralization of water (per lump sum)

Dollars ($)
(written) (figures)

14. Clay Swale Liner (per cubic yard)

Dollars ($)
(written) (figures)

15. 24" Corrugated Metal Pipe (per linear foot)

Dollars ($)
(written) (figures)

16. 8" Plastic Pipe (per linear foot)

Dollars ($)
(written) (figures)

17. 8" Plastic Gate Valve (per each)

Dollars ($)
(written) (figures)

18. Manhole, Frame and Cover (per each)

Dollars ($)
(written) (figures)

19. Revegetation (per acre)

(A) Revegetation with Limestone Screenings

Dollars ($)
(written) (figures)

(B) Revegetation with Ground Agricultural Limestone

_________________________ Dollars ($__________)
(written) (figures)

20. Jute Matting (per square yard)

_________________________ Dollars ($__________)
(written) (figures)

21. Concrete Deep Mine Seal (per cubic yard)

_________________________ Dollars ($__________)
(written) (figures)

22. Curtain Grouting

(A) Cement (per bag)

_________________________ Dollars ($__________)
(written) (figures)

(B) Aggregate (per ton)

_________________________ Dollars ($__________)
(written) (figures)

(C) Fly Ash (per bag)

_________________________ Dollars ($__________)
(written) (figures)

(D) Sand (per ton)

_________________________ Dollars ($__________)
(written) (figures)

(E) Admixtures (per pound)

_________________________ Dollars ($__________)
(written) (figures)

If the undersigned be notified of the acceptance of this proposal within ninety (90) days after the above date, he agrees to execute a contract for the above work stated compensation, and to guarantee the completion of this work in 180 calendar days after the award of the contract. Accompanying this proposal is a fully executed Bid Bond in the amount of 5% of the bid when the total bid is $2,000.00 or more.

Bid Bonds, except those of the three low bidders will be returned after the bid opening. Other bid bonds will be returned after the related contract has been executed. If no contract has been executed within ninety (90) days after the bid opening, then any bond may be returned upon demand of the bidder. Failure to properly and completely fill in all blanks may be cause for rejection of this proposal.

All alternates and unit prices called for in the Contract Documents must be submitted herewith.

______________________	__________	____________
Construction Firm License Number	Date Issued	Place of Issuance

INDIVIDUAL PRINCIPAL

In Presence of
Witness:

FIRM NAME ____________________

SIGNED ____________________

Address ____________________

Telephone No. ____________________

Sign for Identification ________________________________

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CO-PARTNERSHIP PRINCIPAL

____
(Name of Co-Partnership)

In Presence of
Witness:

Address ________________________

Telephone No. ____________________

__________________ as to BY ________________________
(Partner)

__________________ as to BY ________________________
(Partner)

__________________ as to BY ________________________
(Partner)

_________________________ (Sign for Identification)

CORPORATE PRINCIPAL

____
(Name of Corporation)

ATTEST:

Address ________________________

Telephone No. ____________________

_________________________ by ______________________________
(Corporate Secretary) (President)

(Affix Corporate Seal)

The bidder represents, and it is a condition precedent to acceptance of this bid, that the bidder has not been a party to any agreement to bid a fixed or uniform price.

WITNESS:

____________________________ ____________________________(SEAL)
Signature of Officer & Title

SUBSCRIBED AND SWORN TO before me, a Notary Public of the State of

________________________, County or City of ______________________.

this ____________ day of ________________, 19____.

____
Notary Public

Project No. F1-731

AMENDMENT TO D.G.S. FORM "COST ESTIMATE WORKSHEET"
SUMMARY ESTIMATED CONSTRUCTION COSTS

Total Costs include the items of mobilization and demobilization.

APPROXIMATE QUANTITIES	UNIT	ITEM	UNIT PRICES	TOTAL COSTS
Job	L.S.	Inspectors Field Office and Inspection Facilities	L.S.	$ 3,000
50	L.F.	Mine Pump-Down Hole/Monitoring Well	$ 50.00	2,500
25	L.F.	Monitoring Well	8.50	200
1,700	L.F.	Grout Drilling and Insertion	4.25	7,200
Job	L.S.	Clearing and Grubbing	L.S.	10,800
352,500	C.Y.	Grading	0.32	112,800
8,000	C.Y.	Excavation For Deep Mine Seals	0.75	6,000
300	C.Y.	Clay Plug	3.60	1,100
3,700	C.Y.	Removal and Burial of Bony Material	0.50	1,900
1	Each	Concrete Endwall	125.00	100
2,580	C.Y.	Diversion Ditch	1.00	2,600
378	C.Y.	Dumped Riprap	5.00	1,900
Job	L.S.	Dewatering Impoundments	L.S.	2,200
320	C.Y.	Clay Swale Liner	2.00	600
16	L.F.	24" Corrugated Metal Pipe	15.00	200
200	L.F.	8" Plastic Pipe	15.00	3,000
1	Each	8" Plastic Gate Value	800.00	800

SUMMARY ESTIMATED CONSTRUCTION COSTS (CONT'D)

Total Costs include the items of mobilization and demobilization.

APPROXIMATE QUANTITIES	UNIT	ITEM	UNIT PRICES	TOTAL COSTS
1	Each	Manhole Frame and Cover	$500.00	$ 500
		Revegetation		
101	Acre	Revegetation With Limestone Screenings	1,050.00	106,100
1.5	Acre	Revegetation With Ground Agricultural Limestone	355.00	500
1,460	S.Y.	Jute Matting	0.70	1,000
135	C.Y.	Concrete Deep Mine Seal	218.00	29,400
		Curtain Grouting		
175	Bags	Cement	5.00	900
50	Tons	Aggregate	5.00	300
650	Bags	Fly Ash	1.50	1,000
18	Tons	Sand	33.00	600
500	Lbs.	Admixtures	0.50	300
		TOTAL		$297,500

ESTIMATED CONSTRUCTION COSTS
(P.S. 217)

Total Costs include the items of mobilization and demobilization.

APPROXIMATE QUANTITIES	UNIT	ITEM	UNIT PRICES	TOTAL COSTS
Job	L.S.	Clearing and Grubbing	L.S.	$ 1,000
90,000	C.Y.	Grading	$ 0.32	28,800
1,000	C.Y.	Diversion Ditch	1.00	1,000
150	C.Y.	Dumped Riprap	5.00	800
Job	L.S.	Dewatering Impoundments	L.S.	500
320	C.Y.	Clay Swale Liner	2.00	600
19	Ac.	Revegetation (With Limestone Screenings)	1,050.00	20,000
760	S.Y.	Jute Matting	0.70	500
		TOTAL		$ 53,200

ESTIMATED CONSTRUCTION COSTS
(P.S. 218)

Total Costs include the items of mobilization and demobilization.

APPROXIMATE QUANTITIES	UNIT	ITEM	UNIT PRICES	TOTAL COSTS
29,000	C.Y.	Grading	$ 0.32	$ 9,300
9	Ac.	Revegetation (With Limestone Screenings)	1,050.00	9,500
		TOTAL		$ 18,800

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ESTIMATED CONSTRUCTION COSTS
(P.S. 805)

Total Costs include the items of mobilization and demobilization.

APPROXIMATE QUANTITIES	UNIT	ITEM	UNIT PRICES	TOTAL COSTS
Job	L.S.	Clearing and Grubbing	L.S.	$ 3,000
90,000	C.Y.	Grading	$ 0.32	28,800
3,700	C.Y.	Removal and Burial of Bony Material	0.50	1,900
700	C.Y.	Diversion Ditch	1.00	700
160	C.Y.	Dumped Riprap	5.00	800
Job	L.S.	Dewatering Impoundments	L.S.	500
31	Ac.	Revegetation (With Limestone Screenings)	1,050.00	32,600
520	S.Y.	Jute Matting	0.70	400
		TOTAL		$ 68,700

ESTIMATED CONSTRUCTION COSTS
(P.S. 808)

Total Costs include the items of mobilization and demobilization.

APPROXIMATE QUANTITIES	UNIT	ITEM	UNIT PRICES	TOTAL COSTS
Job	L.S.	Clearing and Grubbing	L.S.	$ 200
52,500	C.Y.	Grading	$ 0.32	16,800
800	C.Y.	Diversion Ditch	1.00	800
8	C.Y.	Dumped Riprap	5.00	40
Job	L.S.	Dewatering Impoundments	L.S.	200
16	L.F.	24" Corrugated Metal Pipe	15.00	200
14	Ac.	Revegetation (With Limestone Screenings)	1,050.00	14,700
180	S.Y.	Jute Matting	0.70	100
		TOTAL		$ 33,040

ESTIMATED CONSTRUCTION COSTS
(P.S. 809)

Total Costs include the items of mobilization and demobilization.

APPROXIMATE QUANTITIES	UNIT	ITEM	UNIT PRICES	TOTAL COSTS
Job	L.S.	Clearing and Grubbing	L.S.	$ 5,000
63,000	C.Y.	Grading	$ 0.32	20,200
Job	L.S.	Dewatering Impoundments	L.S.	500
15	Ac.	Revegetation (With Limestone Screenings)	1,050.00	15,800
		TOTAL		$ 41,500

ESTIMATED CONSTRUCTION COSTS
(P.S. 810)

Total Costs include the items of mobilization and demobilization.

APPROXIMATE QUANTITIES	UNIT	ITEM	UNIT PRICES	TOTAL COSTS
Job	L.S.	Clearing and Grubbing	L.S.	$ 1,000
28,000	C.Y.	Grading	$ 0.32	9,000
Job	L.S.	Dewatering Impoundments	L.S.	500
13	Ac.	Revegetation (With Limestone Screenings)	1,050.00	13,700

TOTAL	$ 24,200

ESTIMATED CONSTRUCTION COSTS
(P.S. 902)

Total Costs include the items of mobilization and demobilization.

APPROXIMATE QUANTITIES	UNIT	ITEM	UNIT PRICES	TOTAL COSTS
50	L.F.	Mine Pump-Down Hole/Monitoring Well	$ 50.00	$ 2,500
1,700	L.F.	Grout Drilling and Insertion	4.25	7,200
Job	L.S.	Clearing and Grubbing	L.S.	400
5,000	C.Y.	Excavation For Deep Mine Seals	0.75	3,800
1	Each	Concrete Endwall	125.00	100
80	C.Y.	Diversion Ditch	1.00	100
60	C.Y.	Dumped Riprap	5.00	300
200	L.F.	8" Plastic Pipe	15.00	3,000
1	Each	8" Plastic Gate Valve	800.00	800
1	Each	Manhole, Frame & Cover	500.00	500
1	Acre	Revegetation With Ground Agricultural Limestone	355.00	400
135	C.Y.	Concrete Deep Mine Seal	218.00	29,400
		Curtain Grouting:		
175	Bags	Cement	5.00	900
50	Tons	Aggregate	5.00	300
650	Bags	Fly Ash	1.50	1,000
18	Tons	Sand	33.00	600
500	Lbs.	Admixtures	0.50	300
		TOTAL		$ 51,600

ESTIMATED CONSTRUCTION COSTS
(P.S. 904)

Total Costs include the items of mobilization and demobilization.

APPROXIMATE QUANTITIES	UNIT	ITEM	UNIT PRICES	TOTAL COSTS
25	L.F.	Monitoring Well	$ 8.50	$ 200
Job	L.S.	Clearing and Grubbing	L.S.	200
3,000	C.Y.	Excavation For Deep Mine Seals	0.75	2,300
300	C.Y.	Clay Plug	3.60	1,100
0.5	Acre	Revegetation With Ground Agricultural Limestone	355.00	200
		TOTAL		$4,000

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